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AMERICAN JOURNAL OF OPHTHALMOLOGY

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LIPOID DEGENERATION OF THE CORNEA*

REPORT OF A CASE

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A variation from the normal fat metabolism in the body of the human being may manifest itself in a multiplicity of ways; it may be a generalized disturbance, involving many systems of the body, or it may be localized in a single part of one organ. The generalized disturbances are usually classified in one of four main groups: (1) Tay-Sachs's disease or amaurotic family idiocy; (2) Nieman-Pick's disease, a clinical entity studied by the German pediatrician and pathologist; (3) the Hand-Schüller-Christian syndrome; and (4) Gaucher's disease. In all of these conditions there are widespread pathologic processes, involving skeletal, visceral, skin, and muscular parts of the body; in fact, in some cases, every cell in the body may be affected by the disorder, which is a fundamental metabolic and constitutional defect. In contrast to this type there occurs a localized abnormality of fat metabolism that may involve merely a single organ or a part of that organ; this condition very frequently affects the eye and may demonstrate itself in changes in the lids, conjunctivae, cornea, lens, vitreous, retina, choroid, and blood-vessel system.

Incidence. There is a very extensive literature dealing with the many phases of abnormal clinical and experimental findings in the field of fat metabolism. Hundreds of papers have been written concerning the clinical, physical, endocrinologic, and constitutional factors that may produce these changes; however, there are very few cases in the literature which describe the lipoid changes as affecting the cornea alone.

In 1933, Katz and Delaney[1] reported that only eight undoubtful cases of lipoid degeneration of the cornea existed up to that time; and pointed out that this condition must not be confused with the secondary fatty degeneration of the cornea that oftentimes follows inflammation of the cornea, sclera, or uveal tract. They gave an excellent description of this condition. In the reported cases the age group ranged from the third to the seventh decade, with females affected in a slightly greater proportion than males.

Heath[2] in 1935 reported a clinical entity which he called lipin interstitial keratitis. He described the histologic appearance of the cornea and gave results of laboratory studies of blood and tissue chemistry in these cases. He believed the corneal process to be essentially the end result of a type of irritation coupled with local fat infiltration.

Berliner[3] in 1939 reported the microscopic and slitlamp appearance of the cornea in a case of Hurler's syndrome, a condition which embodies dwarfism, de-

* Read before an ophthalmological section of the American College of Surgeons, at Boston, November, 1941.

formities of limbs, and enlargement of the liver and spleen, with lipoid deposits in the interlamellar spaces of the cornea.

The literature contains no other clinical cases of lipoid disturbance in the cornea alone, and it is to this group that I wish to add this case report.

Etiology. The various forms of lipoid storage in the body may be due: (1) to locally defective oxygenation, (2) to extremely high fat intake, or (3) to some abnormal function of fat metabolism in which the pituitary and adrenal glands play some part. Such changes, seen constitutionally, may also be seen in practically every component of the eye; in the skin of the lids and in the conjunctivae, in xanthelasma; in tuberculous infection of the uveal tract; in the form of asteroid bodies in the vitreous; in sclerosis of retinal blood vessels; in exudates in the retina in various pathologic states; and in the cornea. Although the fat substance stored in lipoidal degeneration of the cornea consists mainly of the cholesterol-fatty-acid group, the blood-cholesterol findings are frequently normal, and there is no clear knowledge of what produces the local defect in oxidation.

Pathology. The body lipoids, in contrast to the neutral fats of the body, exist in a combined and invisible form in the serum and cells of tissue and take part in the normal metabolism of each cell; this process is altered when defective oxidation occurs, and the lipoid material may then be stained and seen in deposits called "fatty degeneration." Duke-Elder[4] states that fatty degeneration is "an unmasking of the tissue fat from its invisible to a visible form owing to oxidative failure and the tissue reaction thereto." The abnormal deposition of this usually invisible material excites a tissue response in the form of wandering histiocytes, the invasion of fibroblasts, and the ultimate formation of scar tissue. This condition, when affecting the cornea, is demonstrable microscopically as follows: In the substantia propria, fat granules may be seen in degenerated lamellae; the deep layers contain the same type of granules in and between lamellae with profuse infiltrations of histiocytes intermixed with polymorphonuclear leucocytes and mononuclear cells; Descemet's membrane and the endothelium do not usually contain fat granules.

Treatment. The treatment of fatty degeneration of the cornea is not a simple matter; it is difficult because the etiology is obscure; reasons for the various localized metabolic breakdowns are puzzling. The diet seems to play little part in causing abnormal fat change such as occurs in the cornea, and a diet deficient in fat does not improve the condition.

Short and Currence[5] studied the effect of vigorous massage coupled with fever therapy in diminishing fat storage and found it comparatively worthless. Because of the value of roentgen therapy in cases of generalized lipoid disturbance, this method of treatment was tried on the right eye in my case. This treatment consisted of a weekly application of 200r to the cornea. Following a course of eight applications little benefit was seen; the tissue of the affected corneae made no response whatever to this therapy.

Keratoplasty would seem to be the means of most promise in an attempt to improve vision.

Case report. A 32-year-old white male, a laborer, was first examined by me in April, 1941. He complained of progressive loss of vision accompanied by no other ocular symptoms. The patient stated that his eyes had been normal until he was 12 years old, when one day in school

he suddenly experienced a substantial loss of sight. His symptoms at that time were extreme photophobia and tearing, with no pain nor headache. He was admitted to a hospital and, according to his statement, all the tests made were negative. Several months elapsed before the photophobia disappeared, and the patient then discovered that he had difficulty in reading small print. This has persisted, and he feels that vision has slowly but gradually decreased each year. There has been intermittent, dull, parietal headache, with a sensation of ocular fatigue and inability to use the eyes for any prolonged period of time during the past several years, but the patient rather discounted any symptoms save loss of vision.

Nothing of significance could be adduced from the patient's past history nor from that of his family, which consisted of father, mother, one sister, and five brothers, none of whom had any eye disease. No occupational factor seemed to be related to the eye abnormality, nor had there been any complaint of inflammation in either eye during the past years. The patient used neither alcohol nor drugs; he smoked one or two pipefuls of tobacco daily. The diet seemed adequate and properly balanced.

Examination of the right eye revealed vision to be 20/70, unimproved with glasses; the lids, conjunctiva, muscular excursions, and tear apparatus were normal. The cornea was of normal size and curvature; very few vascular loops were seen crossing the limbus; the epithelium was normal, but the deeper layers were almost completely opaque save for a 1-mm. band about the limbus and a 2-mm. central disc-shaped area of comparatively clear cornea. The opacity consisted of a solid, plaquelike, yellow, more or less homogeneous fatty tissue with several vertical folds seen grossly. No view of the iris was obtainable. A faint red fundus reflex could be seen through the small, relatively clear central area. No fundus details were discernible. The tension was normal, as was the corneal sensitivity. Vision of the left eye was 20/70; the cornea showed a similar picture with a slightly larger central clear area (fig. 1).

Slitlamp examination disclosed very few overfilled vascular loops extending over the limbus superficially. The yellow,

Fig. 1 (Donahue). Lipoid degeneration of the cornea.

homogeneous opacity occupied the entire cornea, being thinner in the central area, with the epithelium appearing fairly normal with the exception of some crystallike bodies that were glistening and highly refractile. Many vertical folds were seen in Descemet's membrane, but there were no keratitic precipitates.

Physical examination was entirely normal; the Hinton and Wassermann blood tests were negative. Blood studies were normal, including four determinations of the blood cholesterol. The basal metabolic rate was normal. X-ray studies of skull, sella turcica, sinuses, and teeth were normal, and all other clinical and laboratory studies were negative.

It seemed proper to attempt an attack

upon this corneal abnormality with X-ray therapy because of the relative efficacy of such therapy in other conditions of lipoid disease; accordingly, the patient was given a series of X-ray treatments at weekly intervals for a period of eight weeks. The dosage was 200r, and the ultimate hope was that by a process of necrosis or destruction of the abnormal lipoid-filled tissue an area of clearer cornea might be attained. This result has been obtained at the Massachusetts Eye and Ear Infirmary X-ray Department in treating scar tissue upon the cornea. No improvement, however, has resulted in this case of lipoid corneal degeneration following a course of eight weekly treatments. The patient has been advised to have keratoplasty performed upon one eye as a means of probable visual improvement.

520 Commonwealth Avenue.

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MOORE'S SUBJECTIVE "LIGHTNING STREAKS"*

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The illusion of flashing light is a frequent symptom of certain obvious pathological conditions of the ocular fundus, particularly retinal separation. This fact is well recognized even by the textbooks. On the other hand, every experienced ophthalmologist must have encountered many patients who complained of this symptom, yet showed no fundus lesions at the time or later. So far as I know, however, the only published accounts of the illusion so occurring are the two of R. Foster Moore.[1, 2] He states,[2] "A symptom-complex is described which consists in the appearance of flashes of light, most frequently likened to lightning, seen to the temporal side of the eye, never to the nasal side, and vertical in direction. These flashes are accompanied by the simultaneous development of a crop of opacities in the vitreous. They seldom occur before middle age and are more frequent in the female sex. They do not imply any serious disease of the eye either at the time or subsequently." As an explanation, Moore suggested "the possibility of their being due to the slow increase in size and ultimate rupture of a small peripheral retinal cyst."

Moore thus brought out the facts of greatest practical importance connected with the phenomenon; namely, that it is not of serious import, and that it is associated with an apparent increase in senile vitreous opacities. To identify this "symptom complex," and also to give credit where it is due, I believe that the condition should be designated by his name. In his first paper, Moore used the term "lightning streaks," in his second "lightning flashes." I prefer the former term because it accords more definitely with the descriptions generally given by the patients.

Unaware of Moore's observations, I began in October, 1937, to recognize the phenomenon as a clinical entity upon its sudden manifestation in my left eye. I have since found that the condition is more common than I had supposed it to be and than Moore implied, for I have found that many patients who have observed the lightning streaks, fail to mention them until they are specifically questioned.

In my own case I discovered at once that the streaks occurred only when I moved my eyes. When I moved the eyes to the left, a vertically curved streak of brilliant white or slightly bluish light, sometimes slightly zigzag, appeared to flash out far to the left. The streak passed through more than a quadrant of the field, and its convexity was outward. Similarly when I moved my eyes to the right, upward, or downward, a streak appeared on the side toward which my eyes rotated and was perpendicular to the direction of ocular rotation. In view of the fact that I could produce a streak on the right side, Moore's statement that they are seen "never on the nasal side" requires modification.

To me each streak appeared as sharply defined as any actual streak could appear that was seen only momentarily at the periphery of the field. As compared to an actual streak of lightning, it was wider, but of the same apparent duration. The streaks seemed to be within the eye, but this may have been due to the fact that I

* Read before the American Ophthalmological Society, at Hot Springs, Virginia, May 31, 1941.

knew their origin was intraocular. I neglected to question my patients in regard to this point.

On the day I first noticed the streaks, I observed a marked apparent increase in the number of vitreous opacities in my left eye. By illuminating the field of a microscope intensely and then cutting down the illumination by means of the iris diaphragm, vitreous opacities are easily seen. In this way I perceived that the opacities were of the same kind in both eyes, but appeared to be several times more abundant in my left eye. Since then they have not obviously increased in either eye. My visual fields were normal and have remained so. The visual acuity in each eye with correction was and remains 20/10−.

At first the streaks recurred frequently, not only in the dark, but also in ordinary daylight. They gradually became less frequent, and after a short time (I failed to record this time exactly) occurred only in the left field. Now after 3½ years, I occasionally still observe a streak in this field—perhaps once in two or three days. It is about the same size and shape as the original streak was. Voluntarily, however, I can produce it invariably and conspicuously by the following maneuver carried out in the dark: First I rotate my eyes far to the left and maintain this position for a few moments or longer. Then I rotate them far to the right, pause momentarily, and then rotate them back to their original position. The streak seems to flash out always near the beginning of the return movement, but this impression may be erroneous, for during an eye movement the projection of retinal images may be incorrect both as to position and time, a fact that I have ascertained by observing the apparent positions of actual light flashes produced by a stroboscope. Moore made no mention of the fact that motion of the eye is necessary to elicit a streak. Probably his failure to recognize this was due to the fact that the patients themselves are seldom aware of it. However, some patients realize that they can produce a streak by "looking to one side."

Moore explains that the streaks gradually become fainter, and usually disappear within a few weeks. "In one case, however, they lasted as long as six months, and in one case they recurred three years later." In my own case, as just stated, the streaks still occur after 3½ years.

As to the cause of the streaks, I cannot concur in Moore's "guess" that they are due to a retinal cyst. Among other facts against this theory are the great infrequency of retinal cysts, the coincident apparent increase in vitreous opacities, that at the outset a streak may occur in each quadrant of the visual field, and that there is a gradual cessation of the streaks.

I can conceive of but one explanation for the occurrence of the streaks that accords with the facts that they are elicited only by ocular motion and are associated with an apparent increase in vitreous opacities. This explanation is that the streaks are dependent upon separation of the vitreous from the retina; that is, upon shrinkage of the vitreous. From microscopic examinations and as the result of slitlamp studies it is now known that separation of the vitreous does occur in senile eyes. When this process reaches a certain stage, suitable motion of the eye no doubt causes the shrunken vitreous to strike the peripheral retina and thus give rise to the sensation of a lightning streak. A similar streak can be induced by striking the sclera of a normal eye with a finger. This theory obviously explains why the streak is perpendicular to the direction of ocular motion, why it is curved, and why it may

be produced most conspicuously and certainly by the maneuver I have described. Traction of the vitreous upon the retina seems to be excluded as an explanation by the fact that the streak appears on the side towards which the ocular rotation is directed. That the streaks are most frequently observed in the temporal field may be due to the fact that the visual field extends farthest on the temporal side, and to the asymmetry of the vitreous body, an asymmetry largely determined by the attachments of this body to the ora serrata and optic disc. Cessation of the streaks is no doubt due to further shrinkage and liquefaction of the vitreous. The apparent increase in vitreous opacities is readily explained by the shrinkage of the vitreous bringing the already existing opacities into a smaller space, and hence making them appear more abundant not only to the patient but also to the examiner.

Why separation of the vitreous occurs in senile eyes I do not know, but the liquefaction associated with senile vitreous opacities may be an important factor. In my own case, trauma may have played a part. About six months previous to the time I first saw the streaks, a tennis ball struck my left spectacle lens, thus causing a contusion of my left eye. The injury seemed fairly severe, although the glass was not broken and my vision was only momentarily impaired. The fact, however, that lightning streaks are more frequent in females would be against trauma as an important factor in their etiology.

An interesting question, not mentioned by Moore, is: Does the patient actually know in which eye the lightning streaks arise? For without some clue one is not consciously aware with which eye one is seeing. Subconsciously, however, without any clue, the brain is "aware" from which eye each image is received, otherwise binocular stereopsis would be impossible. It may be that patients are not actually aware in which eye the streaks arise, but simply guess this correctly. As a matter of fact, some patients assert that they do not know which is the affected eye. The reason that the guess is correct may be due to the fact that the streak is most conspicuous in the temporal field. Hence when the streak appears to be most conspicuous on the right, the patient correctly guesses that it arises in the right eye, and when it is most conspicuous on the left, that it arises in the left eye. The reason one can believe him to be correct is that the vitreous opacities are more numerous in the eye he designates.

Moore states that in two of his cases the streaks occurred in both eyes, but does not explain how he arrived at this conclusion. Presumably his evidence was simply the patients' own judgments, which, as I have just pointed out, cannot be relied upon. It may be that when streaks were observed in both the right and left field of the same eye the patient thought they occurred in both eyes. This would account for Moore's statement that the streaks never occur in the nasal field. To me it seems *a priori* improbable that they would first occur in each eye within the same day. However, in one of my cases, the streaks appeared for a time in the right eye, ceased, and then occurred in the left eye. That in this case the patient correctly designated the affected eyes was indicated, without reasonable doubt, by corresponding increases in vitreous opacities.

Since photopsia is a frequent symptom of retinal separation, the question arises whether subjective lightning streaks may not indicate an increased liability to this disaster. Probably the streaks are usually different in appearance from the light flashes of retinal separation, but it would be unsafe to rely upon a patient's state-

ments to establish this difference in any particular case. Whenever a patient complains of photopsia, I examine his fundi with special reference to the possibility of finding retinal separation. In not one of such cases in which I found the retina *in situ* has the patient returned to me with retinal separation in the eye examined. One patient, however, returned five years later with retinal separation in the other eye. My experience thus accords with Moore's statement that subjective lightning streaks are not of serious portent. Further experience, however, is necessary before it can be stated definitely that they are entirely without prognostic significance. Retinal separation is relatively infrequent, and hence a considerably increased or decreased liability to develop it might not be revealed in the study of a small series of cases. Moore's series consisted of 33 cases, and, by excluding the patients seen but once the number is reduced to only 16 cases. It would still seem wise to keep under observation any patient who complains of photopsia. In such cases, as in those of ocular injury, I frequently show the patient how to make a rough test of his visual field.

Conclusions

Moore's subjective "lightning streaks" are observed by many patients with numerous senile vitreous opacities. Not infrequently such patients fail to mention the streaks until specifically questioned.

The streaks are elicited only by ocular motion.

In most cases they are referred only to the temporal field, but exceptionally, in the same case, a streak may be referred to the upper, lower, or nasal field according to the direction of ocular movements.

The patient probably is not actually certain from which eye the streaks arise, but guesses this correctly since they appear to be most conspicuous on the same side as the affected eye.

The streaks are dependent upon separation of the vitreous. A streak is produced when an ocular movement causes a sudden impact of the shrunken vitreous upon the peripheral retina.

The associated apparent increase in vitreous opacities is due to the concentration of the previously existing opacities into the smaller space occupied by the shrunken vitreous.

The predominance of the streaks in the temporal field is probably due to the fact that this field extends farthest to the periphery, and is also due to asymmetry of the vitreous body.

The streaks are of slight, if any, prognostic importance.

305 Commonwealth Avenue.

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[1] Moore, R. Foster. Subjective "lightning streaks." Brit. Jour. Ophth., 1935, v. 19, p. 545.
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PROCEDURES IN INTRACAPSULAR CATARACT EXTRACTION*

A NEW METHOD

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The success of various surgeons with the intracapsular extraction of cataract in producing excellent and lasting visual results has definitely established this procedure as a safe and desirable one. It is the purpose of the writer to record here brief analyses of the principles of the techniques of intracapsular cataract extraction as performed by other surgeons, to relate the author's own experiences, to discuss variations in technique, and those of a method that he has originated, and finally to point out how these may be coordinated and applied to the various types of zonules and cataracts. The particular indications and contraindications will not be discussed, but it may be stated that under certain conditions intracapsular extraction is the operation of choice. It should also be stated definitely that just as surely the extracapsular operation is the method that will give the best results under other conditions.

The removal of the lens in capsule requires the rupture of the zonule. The break occurs at its union with the lens capsule. This should be effected with a minimum of trauma and reaction, both immediate and late. Various observers have noted (1) that a small percentage of zonules rupture easily, and that almost any procedure is effective in the removal of the cataract; (2) that the greater number of eyes show average or normal resiliency, elasticity, and resistance to rupture of the zonule under safe or an ordinary degree of pressure, traction, and rotation; and (3) that a small percentage of eyes show greater than the average or normal resiliency, elasticity, and resistance to rupture, and are not delivered by the ordinary degree of pressure, traction, and rotation. This last may be the normal condition, for it is present in the normal eye in which there is no cataract, and the conditions under which the zonules rupture easily and safely are indications of degeneration or deterioration of the healthy elastic quality of the zonule coincident to or accompanying the development of cataract. Suffice it to say, however, that the three classes of zonules require three different classes of procedures, and a surgeon who follows only one procedure may be able to deliver only the first two classes safely by the intracapsular method. There is no age group into which these three classes fall. One might expects resistant zonules in the younger group of cataract patients, and the weakest zonules in those over 60 years of age, but the conditions found do not permit such a classification. The racial groups undoubtedly vary; thus the early deterioration of the Asiatic[1] groups, on whom Smith operated, provided more fragile zonules than those found in the Caucasian groups.

METHOD OF INTRACAPSULAR EXTRACTION

The methods that have been described and that used are: First, the external-pressure method known as the Smith Indian[2] method; second, forceps extraction, with or without the aid of external pressure; third, vacuum-cup extraction, either with a simple apparatus, such as a

*From the Departments of Ophthalmology of the College of Medicine, New York University, and Bellevue Hospital. Read at the annual meeting of the American Ophthalmological Society, Hot Springs, Virginia, May 28 to 30, 1941.

Dimitry syringe, or with the more complicated pump erisiphake of Barraquer;[3] fourth, direct interference with the zonule; fifth, electrocoagulation; sixth, loop extraction.

Intracapsular extraction by external pressure. The Smith method attracted many surgeons to India to witness the practice of this colorful British Indian Medical Service surgeon, who had the opportunity to employ the method frequently in his surgical work on the eyes of the natives, who for various reasons developed cataract at a relatively early age. The methods they observed did not help the European and American surgeons greatly because they learned that the average cataract in the eye of the Caucasian does not behave like that of the Indian. During his visit to America, Smith operated in a number of clinics, but without marked success. His application of pressure below by means of a lens hook after the section and iridectomy had been made may result in dislocation and delivery of the lens by tumbling, and without loss of vitreous if the zonule is fragile, and this may indeed have been the condition that existed in the cataracts of the native Indians whose tissues, including the lens, degenerated early and whose zonules were fragile. Dutt[4] has modified the instrument and has extended the explanation of the principles involved in external pressure. The method may be applicable to a case of bulky cataract in the intumescent stage in which the zonule may be fragile. Attempts to grasp the capsule with the forceps when the capsule is taut may prove futile. The vacuum cup may take hold, but only with difficulty. Moreover, the capsule may prove friable if direct application of any instrument is attempted. There is no objection, however, to the delivery of such a cataract by the extracapsular method, and, as a final point, it may be best to delay operation and permit such a case to progress to the mature stage, when it may be delivered more easily by either the intracapsular or the extracapsular method. However, if increased ocular tension develops and is not controlled by pilocarpine, extraction may be necessary, and then the intracapsular method may be desirable. In such a case the experience of Vail[5] in the delivery by simple pressure, carefully applied and without the use of any traction, is of value if the zonule is weak. Needless to say, the delivery by external pressure alone of cataracts whose zonules are resistant and non-yielding results only in disaster.

Direct interference with the zonule. This method may be regarded as desirable if it can be performed in a non-traumatic manner. The attachments of the zonule to the ciliary body, vitreous, and retina are such that the late effects of excessive traction or external pressure may be most objectionable. Waite has used the operation of zonulotomy with success. The close proximity of the zonule to the vulnerable vitreous has deterred many surgeons from even considering direct interference with the zonule. Nevertheless, such interference is desirable in cases with resistant, unyielding zonules that do not rupture within the limits of safety by pressure applied externally.

The vacuum-cup method. The suction method of phakoeresis of Barraquer has not found many adherents because of the complicated nature of the apparatus. In this country Hulen[6] and McDannald[7] used simpler appliances at an early date. Barraquer had marked success in his own clinic, but was not so fortunate in the American clinics. There have been some modifications of this method by Castro-

viejo[8] and by others, but it may be said that equally good results may be accomplished with less difficulty by simpler methods and with less danger in the averagely skilled hands. The object of this discussion is not to condemn the method, but simply to point out that from his observations of its application the author has had no desire to use phakoeresis. If suction is to be employed, the simpler syringe of Dimitry is more easily applied. This may possibly be rendered still simpler if Dimitry[9] or some other operator modifies the instrument by shortening the barrel of the syringe or by pressing and locking the spring before applying it to the capsule, so that the instrument can be manipulated accurately with one hand. Needless to say, the mouth-suction method for intracapsular extraction is most unsatisfactory. The electrocoagulation of the immature cataract has not been successfully applied, and those who are interested in this method are referred to the original writings of Lacarrère.[10]

Intracapsular loop extraction. The method of loop extraction of the lens in capsule has been described elsewhere, under the caption of subluxated or dislocated lenses or when vitreous is present in the anterior chamber.[11] In addition to what has been said there, the method is applicable to the completely dislocated lens sunk in the vitreous, or to one that is hinged only by a narrow band of zonule, and finally to the lens dislocated into the anterior chamber. For the recognition and localization of dislocated lenses prior to and during cataract operation, the phenomenon of fluorescence,[12] as demonstrated by the ultraviolet lamp and filter, is most helpful. The procedure of using the loop to remove uncomplicated cataracts has not, for obvious reasons, gained adherents.

Intracapsular extraction by means of combined traction, rotation, and pressure. Observation of the effects of pressure sufficient to deliver all types of cataract in capsule by external pressure alone —namely, the immediate effect of loss of vitreous and the later effect of traumatic iridocyclitis, incarcerated iris, detachment of the choroid and retina, and similar conditions—led surgeons to devise other methods, or to combine the effect of traction and rotation of the lens by means of a grasp of the capsule with the effect of external pressure. It is not possible in the present paper to discuss all the methods that have been described. The author will briefly touch on those that bring out certain helpful points. The lens is grasped below and caused to tumble, or is grasped above and caused to slide out.

Knapp's method

Knapp[13] applied forceps to the capsule, below the center of the pupil, moved the forceps from side to side, up and down, and rotated them until dislocation of the lens below resulted. When the lower edge of the cataract appeared in the pupillary space, the forceps were released and withdrawn. External pressure, then, with the point of the hook causes the lens to tumble and to be delivered, the remaining zonule above being separated by a lateral stroking motion with the pressor instrument.

The methods of Stanculeanu, Török, and others

Stanculeanu[14] and Török[15] and Verhoeff[16] applied the forceps below and combined lateral and circular or rotational traction movements, at the same time making interrupted pressure with a Daviel spoon or with the hook through the cornea. These operators did not release the hold of the forceps on the capsule. Similar procedures were used by

Kalt,[17] Elschnig,[18] Arruga,[19] and others.

Verhoeff[16] and Bracken[20] stressed the important point of putting the zonule on the stretch by making traction with the forceps from below, while the point of the hook works advantageously through the cornea.

The method of Davis

Davis[21] has declared that his operation is 90-percent pressure and 10-percent traction, and Vail, in commenting upon this statement, expressed the belief that this is simply the old Smith operation, but this is incorrect. Davis's method consists of making a large central grasp of the capsule, rendering it taut, and thus exerting more than 10-percent traction; but he differs from the other operators in holding his forceps steady while he makes pressure below with the edge of the flat lens spoon.

The method of Verhoeff

Verhoeff[22] introduced a new feature, that of grasping the lens capsule above, letting the forceps straddle the equator of the tilted lens nucleus, and moving the upper part of the lens to and fro laterally with forceps while his hook or ring dislocator is moved from side to side below. The lens is permitted to slide out from the anterior chamber and is not tumbled. Evidently the effect of tension of capsule on the zonule below was utilized, for in his illustrations the capsule in resistant cases is observed to be "stretched out in tent-like fashion."

The author's modification of the Verhoeff sliding delivery of the lens to permit intracapsular extraction through the round pupil

Verhoeff devised his operation particularly for sliding delivery of the lens through a coloboma by grasping the capsule at or nearly at the superior equator. The difficulty of grasping this area of capsule with the pupil uncut may be overcome if the forceps that are held in the left hand are slid, blades first, beneath the iris at 10 o'clock on the lens dial, for either eye, and then turned so that the heel of the forceps displaces the iris and allows a direct view of the anterior face of the upper equatorial region for the tangential application of the forceps. Evidence that the application has been made at or near the superior equator exists in the fact that the cataract, on delivery, invariably slides out and shows no tendency to be delivered sidewise or to tumble.

The protection of the vitreous

Verhoeff stressed the fact that the vitreous must be protected by holding the lens back and in opposition to the posterior lip of the incision. Knapp and others urged that the vitreous be protected by tumbling the lens. In the experience of the author the vitreous is just as safe in one method as in the other, and he believes that loss of vitreous is dependent on other conditions. In the sliding delivery the lens may be lifted about 3 mm. for a view of the vitreous, and when lying relaxed in the normal position normal vitreous does not appear to need protection. The handling of abnormal cases has been dealt with elsewhere.[11]

The author's method of the preliminary rupture of the lower semicircle of zonular fibers or lamellae

The author[23] has introduced a modification of the pressure and traction delivery and has used it with success in cases in which the zonule ruptures easily on slight pressure, but also in those cases in which an average, ordinarily same amount of pressure, traction, and rotation is necessary to cause rupture of the

zonule and for delivery of the cataract.

The preliminary pressure that is used to subluxate the cataractous lens before the intracapsular forceps is applied by the point of a hook (preferably not a heavy or blunt point but a flattened point, such as is found on the Jamison[24] muscle hook). The author has devised an intracapsular lens expressor, using the Jamison hook tip on his own 5-mm.-diameter light-weight cylindrical handle. The pressure is applied just inside the clear periphery of the cornea, the ring of the limbus being easily and distinctly felt. The principle involved in the confinement of pressure to this inside circumference of the cornea lies in the anatomic fact that the lens diameter (approximately 10 mm.) is less than that of the transparent cornea (approximately 11.5 to 12 mm.), and, therefore, the zonular fibers attached to the equator of the lens are just inside the corneal periphery. The flattened point of the hook, as described, may be insinuated between the lens equator and corneal periphery, reaching the zonular fibers or lamellae through the thickness of cornea and iris. The point first pressed upon is at the 6-o'clock position; next another point is pressed upon at 8 o'clock, and then at 4 o'clock, on the corneal dial, and a slight stripping movement used, designed to slide down over the convexity of the inferior equator of the lens and release the zonular fibers from their attachment at the equator. As an alternate to point pressure, circumferential pressure in curvilinear fashion inside the ring of the limbus of the cornea may be applied, gradually covering almost all the lower semicircle of the limbus. The degree of pressure and indentation of the cornea varies in the individual case. In general, however, the pressure may be described as sudden and sharp, indenting the cornea 2 to 3 mm., but within the limits of what may be regarded as safe. Indications of yielding and of rupture of the zonule and the movement of the lens, its tilting and presentation when subluxated, must be learned by experience. It may be said that when the zonule has ruptured there is less resistance, and the body of the lens rises. It is never necessary, in an attempt to remove a cataract in capsule, to apply pressure over the white portion of the sclera, traumatizing the ciliary body, and disturbing the vitreous body. The reasons for taking the preliminary steps of rupturing the zonule below before applying the forceps are: (1) that greater ease is experienced in picking up the capsule that has been relaxed by removal of a portion of the zonule; (2) that a shorter period of time is required for the delivery of the lens after the forceps have been applied. It is believed likewise that the preliminary pressure is also sufficient to sever the light union, cohesion, or close coaptation that exists at the ligamentum hyaloidea capsulare between the lens and the vitreous without any injury to the latter. In certain favorable cases in which the lens may be lifted from its patellar fossa about 3 mm. by forceps applied at the superior equator, the vitreous may be observed, lying relaxed in its normal position, posterior to the plane of the hyaloid membrane in the patellar fossa.

The elevation of the corneal flap and the application of the forceps

The author[23] has described elsewhere the central suture that is used to retract or elevate the corneal flap in order to obtain a direct view of the iris and of the anterior lens capsule. Following Verhoeff's lead, the upper portion of the capsule has been chosen as the most desirable site for the application of the intracapsular forceps, for it is at this point that they can be applied to the capsule ever so lightly with the least backward pressure, the capsule being in direct view when the corneal flap is lifted. It seems

preferable not to apply the forceps below, since they cannot be applied as accurately here, due, first, to the curvature of the inferior portion of the lens sloping away from the surgeon's grasp; second, the capsule and the grasp of the forceps cannot be seen clearly through the hazy collapsed cornea; and third, in practice an undesirable backward pressure, be it ever so slight, on the lens must be made in order to pick up the capsule. If a complete iridectomy has been performed, then the forceps may be applied to the anterior face of the equatorial region of the lens capsule in practically the same manner as is done by Verhoeff, the nucleus being tilted by gentle pressure on the lower equator through the cornea by the application of the point of the hook just within the limbus, and the grasp of the forceps made to straddle tangentially the new equator of the tilted nucleus. If there is no coloboma, then the blades of the forceps held in the left hand are slid beneath the iris, to take hold of the anterior face of the equatorial region of the lens capsule at about 10 or 11 o'clock on the lens dial. When a proper hold of the capsule involving a 4- or 5-mm. area has been secured, as may be known because of the direct view of the area, the traction suture on the corneal flap may be released. The turning of the corneal flap by the traction suture does not lead to striped keratitis, corneal opacity, interference with healing, or other undesirable result.

The author's method of making pressure, traction, and rotation

The forceps having been applied to the lens capsule above, they are lifted slightly vertically and drawn toward the surgeon. One may quickly determine whether the inferior zonule has been ruptured by the initial or preliminary pressure or whether the zonule is still intact. If it has been ruptured, the cataract may be delivered quickly and easily with a slight degree of traction and pressure. If the zonule is still intact, then traction toward the surgeon serves to make the inferior zonule in the vertical meridian taut, point pressure being then applied with the expressor at the 6-o'clock position. Rotation is next made clockwise, so that the forceps with the capsule in their grasp are moved to 2 o'clock, while the point pressure is made directly opposite at 8 o'clock, this being the position in which the zonule is made taut by traction at 2 o'clock. Counterclockwise rotation is then made with forceps moved to the 10-o'clock position, and pressure is made at 4 o'clock. By this coördination of rotation and traction, with its effect of tension on the zonule directly opposite, and pressure, the greatest result with the least effort is accomplished. At the exact moment of making the point pressure the forceps are held still. If a repetition of this point pressure once or twice does not bring about the desired rupture below, it may be said that the limit of safe traction and pressure has been reached. As to time, it is difficult to determine just how long one may work safely with the zonule to effect intracapsular delivery. Some surgeons are able to maintain pressure for 20 or 30 minutes, but it would seem that five minutes should be sufficient to effect the delivery of the average cataractous lens by coördinated traction, rotation, and pressure measures as described. If a small hole or tear in the capsule above is accidentally made by the forceps, experience has shown that a second effective hold for the delivery of the cataractous lens in capsule is possible. The rupture of the zonule, the freeing of the lens, and the time for the removal of the cataract by sliding it out through the incision are recognized by experienced and alert surgeons. The lens in the ordinary or average case of cataract may be delivered safely in this manner.

THE AUTHOR'S METHOD OF INTRACAPSULAR DELIVERY OF CATARACTS WITH RESISTANT, ELASTIC ZONULAR LAMELLA

If the ordinary or safe degree of such manipulation fails to deliver the lens, it would seem improper to continue the same maneuvers that have proved inefficient for the purpose and that would be dangerous if they were continued or if the pressure and traction were increased. In such cases the capsule is also resistant and does not rupture. The surgeon may be tempted to continue the traction and pressure and even to increase them. It became obvious to the author, when the difficulties of resistant, elastic, zonular fibers or lamellae were encountered what steps to take. The anatomic conditions were in direct view of the surgeon. The term zonular "lamella" is used, because during the author's intracapsular operations attachment of the zonule has been observed to be in the form of a membrane or lamella. When a coloboma has been made by complete iridectomy and the lens is lifted vertically and tilted by the combined action of the forceps and hook, the equator may be plainly seen; extending from this, in cases favorable for such observations, is a thin semitransparent, crinkly, glassy, or cellophanelike sheet of zonular membrane. Troncoso,[25] Duke-Elder,[26] Minsky,[27] Goldsmith,[28] and others have described the parts of this zonular membrane. Apparently the strongest or most important part is attached to the anterior equatorial area of the lens. Through the zonular membrane, when the lens is lifted, may occasionally be seen the face of the vitreous, and one is enabled to determine whether the vitreous body is relaxed and in a correct posterior position, or whether it is under tension and bulging forward. There is more or less space between the equator of the lens and the zonular lamella and the face of the vitreous. In normal cases this space is at least 3 mm. wide when the lens is lifted, and only in these cases may the following maneuver, which is the obvious one, be employed: A sterile curved blunt instrument—and for this purpose the elbow of the same intracapsular lens expressor aforedescribed—is useful. Pressure below is released by removal of the point of the hook from the cornea.

With the lens-capsule forceps holding the superior equator of the lens slightly upward in a safe position, the elbow of the hook is applied to the curved surface of the easily visible equator of the lens, the zonular lamella which is put under tension by being lifted being thus rubbed off. The attachment of the zonule, which previously seemed tough and resistant, now seems to dissolve at the most gentle touch. First a dehiscence is seen, then a disinsertion, and finally a circumferential tearing on rotation occurs. Here again the principle of tension through traction and point pressure for greatest effect with the least effort is employed. After tearing of the central area of the zonule is started, the lens is rotated clockwise to 2 o'clock and the zonule touched or stripped at 10 o'clock, then counterclockwise rotation is made to 10 o'clock and the zonule touched or stripped at 2 o'clock; a similar procedure is likewise found effective on the zonular lamella as exposed. At the exact time of the touching or stripping, the forceps, having effected the tension by traction or rotation, are held still. Point pressure or simply touching the zonule seems sufficient to effect a dehiscence.

A variation that may occur is a circumferential stripping following closely the curved equator to produce the disinsertion. Between 10 o'clock and 2 o'clock the zonule is exposed over an arc of 60 to 90 degrees, and is vulnerable in direct view to a safe approach of direct interference by the surgeon with coördi-

nated traction, rotation, and pressure. When once disinserted over from 60 to 90 degrees, further tearing occurs easily by rotation, and with pressure inferiorly through the cornea opposite the point of traction. Cataractous lenses with resistant zonular lamellae may thus be delivered safely without continued or excessive pressure and without repeating efforts that are ineffective. The maneuver of stripping the zonule was first discovered by the author when he saw it occur as he was lifting the border of the iris over the equator of the lens by the employment of the elbow of the hook. This observation, and the further tearing of the zonule on rotation of the lens, led him to attempt this zonule stripping in a second difficult case. He has since used the maneuver in about 25 cases.

Experience of the author with the method. The description of this particular technique is published only after four years' experience in its use. No complications could be traced to its employment, although one may readily conceive that loss of vitreous, infection, and other serious sequelae may follow if proper manipulation, relaxation, and aseptic precautions are not observed. There is, however, no greater danger of any of these complications occurring than there is by using any other instrument in the anterior chamber. It is not the intention of the author at this time to advocate its use for adoption by anyone, but simply to state the facts concerning the applied surgical anatomy involved and the feasibility of solving the problem of resistant zonule where intracapsular extraction is desired and to show how various procedures of intracapsular cataract extraction may be coördinated for use in the various classes of cataracts and zonules. The author would not hesitate to have this manipulation carried out on his own eyes if, when, and ever it became necessary by a surgeon who had become familiar and adept with the technique.

Summary and Conclusions

Extracapsular cataract extraction is the operation of choice in many cases. Intracapsular cataract extraction can be made as nontraumatizing as extracapsular, but should not be practiced by the beginner until he has mastered the extracapsular technique and thus has obtained a familiarity with the reactions of the eye undergoing surgical manipulations. Only then, when relaxed, may he attempt some of the variations necessary to meet the exigencies in individual cases. It may be said that only when the operator is relaxed may the eyes see calmly the points in the applied surgical anatomical conditions that have been described. These may be demonstrated on fresh normal eyes under experimental surgical conditions, as Goldsmith has done. The zonule is observed as a membrane, and not as a group of fibers. The three efforts that have been described may well indicate the three classes of varying strengths of zonular membranes: (1) those that rupture or tear easily; (2) those that rupture or tear with a safe or ordinary or average pressure, traction, and rotation; and (3) those that are resistant, elastic, unyielding, and do not rupture or tear with ordinary safe and average pressure, traction, and rotation.

The principles of the use of external pressure, of traction, and of rotation in the intracapsular extraction of cataract have been discussed. The manner in which they have been used by various surgeons has been related, and the coordination of the procedures for the greatest effect with the least effort and the application to the various types of zonules have been suggested.

A new and original method has been reported, in which a cataractous lens with zonular lamella that proves re-

sistant, elastic, and unyielding to the ordinary safe and average pressure, traction, and rotation may safely be delivered in capsule by means of stripping the zonular membrane from the superior equator of the lens in direct view of the surgeon. Four years' experience with this new method in about 25 cases warrants the author in reporting it as feasible, interesting, and practical in difficult cases. It is not recommended nor advocated for general teaching or adoption, but the author has had no reason to regret its use.

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PERIPHLEBITIS AND PHLEBITIS RETINAE*

A CASE REPORT

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This case is reported not only because it is rare, but also because it is the first such case on record in the Department of Eye, Ear, Nose, and Throat of the Philippine General Hospital. Moreover, the patient has been followed for a period of almost a year to recovery and interesting observations have been made. Due to lack of facilities no fundus photography has been possible but rough sketches of the lesion (figs. 1 and 2) may help to elucidate the case. Of the available textbooks on ophthalmology that of Duke-Elder[1] deals with the subject most extensively. Ballantyne and Michaelson[2] made an analysis of 68 cases reported in the literature up to 1937 and added a case of their own.

CASE HISTORY

A. N., 23 years old, male, single, a Filipino laborer, applied at the Outpatient Service of the Department of Eye, Ear, Nose, and Throat of the Philippine General Hospital, on July 15, 1940, because of dimness of vision of the left eye, occasional headache, and dizziness. He had been having occasional headache for the last three years, and in March, 1939, was admitted into this Hospital for apical lobar pneumonia. A week before the onset of his present ocular complaints he had severe and intermittent headache for about three days followed by blurring of the vision of the left eye. No inflammatory signs were observable externally in the eye. There was no history of trauma. When seen at the Out-patient Service the following data were noted: The right eye was normal. Vision in the left eye was 20/40, J2. There was haziness of the upper portion of the disc border and adjoining retina. Either there were no other lesions or they were missed. The tentative diagnosis of optic neuritis, acute, left eye, was made, and the patient was referred to the dentist, who extracted about six defective teeth.

He was admitted to the Eye, Ear, Nose, and Throat ward on August 6, 1940, about a month after the onset of the illness. Except for the extracted six molars and the presence of some exudate in the crypts of the tonsils, which were small, the important findings were in the left eye. Externally nothing abnormal was seen. Vision was 20/20. The fundus (fig. 1) revealed the main lesion. The media were clear. The superior border of the disc and adjacent retina where the retinal vessels emerged from the papilla appeared hazy and somewhat elevated and striated. The vessel walls, however, were very distinct. The superior temporal vein appeared normal up to its first superior branch. This branch was distinct for a distance of about a disc diameter. After this it appeared beaded. The peripheral portions of this vein as far outward as could be traced were obliterated. Its course and branchings were replaced by a whitish streak several times wider than the lumen of the vein, but with the branches and pattern of the vein as it would have appeared were its lumen filled with blood. At the sides of the oc-

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cluded vein, from its beaded portion to its periphery, were areas of retinal hemorrhages of irregular distribution and uneven density.

Following the main superior temporal vein, its upper terminal branch, although not completely obliterated, had a beaded appearance like the proximal part of the first superior branch. This beading was retinal hemorrhages at the sides of this vein, but not so extensive as that of the first superior branch, and no whitish retinal deposits outside those along the course of the veins. The macula appeared to be normal. The rest of the fundus, including the retinal arteries and the other veins, was also normal. The fundus of the right eye was normal and not

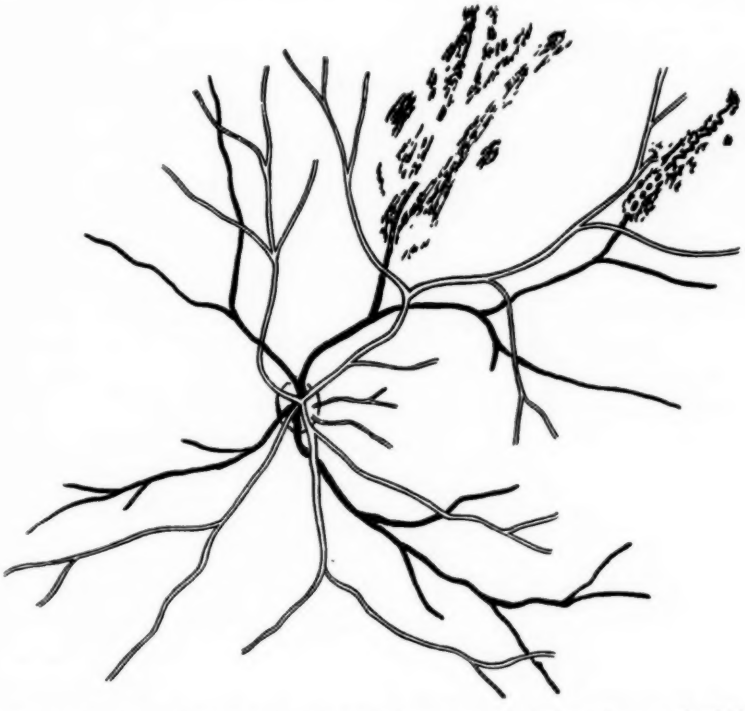

Fig. 1 (de Ocampo). Fundus of the left eye on admission, August 6, 1940. Arteries are hollow, veins solid.

not produced by a simple narrowing or disappearance of the lumen of the segments of the vein, but the surrounding retina on both sides, for about one to two vein diameters, appeared whitish, so that these whitish areas along the course of the vein seemed roughly circular with the narrowed column of venous blood in the centers of some of them.

Beyond this beading the vein was slightly more tortuous and congested than normal. There were also some areas of anemic. Ocular tension was: R., 27 mm. Hg (McLean) and L., 21 mm. Hg. The peripheral field of vision was practically normal for both eyes. The blood pressure was 130/80.

The important laboratory findings were: Urine, normal. Blood (August 10, 1940): red blood corpuscles 5,260,000 per cu. mm.; hemoglobin, 60 percent; color index 0.6; white blood corpuscles 8,343 per cu. mm.; polymorphonuclear lymphocytes 65 percent; lymphocytes 25 per-

cent; endotheliocytes 1 percent; eosinophiles 6 percent; myeloblasts (stab) 3 percent. Reticulated red blood corpuscles 1.9 percent; platelets 397,080 per cu. mm.; coagulation time 3 minutes, 50 seconds; bleeding time 2 minutes, 30 seconds. After a month, the hemoglobin improved to 85 percent and the color index to 0.84. The sputum was normal. Feces (several times examined) on August 11, 1940, contained hookworm eggs and larvae (+ +); on August 14th, Ascaris ova (+); Endamoeba hystolytica cysts (+); on September 11th, Endamoeba coli cyst (+ +). The Wassermann reaction of the blood was negative. There were no malarial parasites in the blood. X-ray study of the lung was negative. A tuberculin test (0.2 mg. and 0.4 mg. O. T.) gave negative focal and general reactions but with a moderate cutaneous local reaction; 0.5 mg. (O. T.) gave a positive local reaction and a very doubtful retinal (focal) reaction; X-ray study of the adrenals showed no evidence of calcification in the region of the adrenal glands; an X-ray film of the teeth revealed moderate pyorrhea.

On August 15, 1940, the vision of the left eye was 20/20 and the retinal hemorrhage showed beginning absorption. The condition of the veins was not much changed. About two weeks later, the blurring of the disc border had considerably subsided; the retinal hemorrhages were becoming thinner; the beaded portion of the vein showed more blood in the vessels. On September 5, 1940, the areas of retinal hemorrhages were much reduced in size and number. Along the course of the obstructed portion of the first superior branch of the upper temporal vein could be seen some capillary-like blood-column segments. On October 10, 1940, there appeared at about the 3:00-o'clock position, near the disc border, a whitish area of about one-fourth disc diameter, somewhat elevated, with indistinct outline and a pin-point retinal hemorrhage in its center. This cleared up in about two weeks.

The patient was discharged on December 7, 1940, with normal vision, after a stay of four months in the ward. The retinal hemorrhages were almost completely absorbed; the disc was normal; the capillarylike blood column along the course of the occluded vein was more distinct, it appeared slightly tortuous but not uniformly continuous.

As an out-patient, he was seen on January 12, 1941. The vision was normal. No trace of the retinal hemorrhage remained. The upper branch of the vein presented a practically continuous column of blood along the whole course of the vein and slightly more tortuous. In the most extreme periphery several branches could be made out. There was still that whitish streak, about two vein diameters on both sides of the blood column throughout its whole extent; in the lower branch, no more interruption nor beading of the blood column, but instead of the continuous whitish streak there were still two or three round whitish areas beneath and at the sides of its extreme end.

The patient was seen again on February 16, 1941. In the fundus of the left eye, the obstructed vein seemed to be opened throughout its course with apparently more branches than normal at its extreme periphery. It appeared slightly more tortuous than normal in some places and slightly wider near its periphery. The whitish streak in the bed of the upper branch was still present, wide and irregular, while in the course of the lower branch the whitish areas remained, without interrupting the view of the vein.

The last time the patient was seen was on May 10, 1941. The fundus (fig. 2) was practically similar to that observed three months before.

The treatment given consisted mainly of reduced iron for the anemia, emetine for the amoeba, anthelmintics for the intestinal parasites, dental treatment including extraction of six molars, tuberculin, and tonics.

Discussion

This patient was admitted into the Hospital with a tentative diagnosis of anemia with retinal lesion or retinopathy, due to anemia. In discussions of the case at the weekly staff conference several questions arose:

Where was the lesion or rather what structures of the retina were involved? There was no doubt that two branches of the superior temporal vein were pathological, the upper one throughout its course was completely occluded after its lumen or blood column had shown beading. In its place was a whitish column much wider than the vein, irregular and branching like a vein, and flanked on the sides with retinal hemorrhages. The lower branch had beading with whitish circumscribed areas along its course more tortuous and congested especially distal to these pathologic segments. It seemed therefore that while the upper branch was involved throughout its course, the lower branch was similarly affected but only in segments. The retinal hemorrhages were at the sides of these pathologic veins. There was also a whitish somewhat raised area around the disc border just near the main trunk of the superior retinal vessels. This subsided within two weeks. The rest of the retina, and the other blood vessels of this eye and those of the other eye were normal. From the foregoing findings it was evident that the

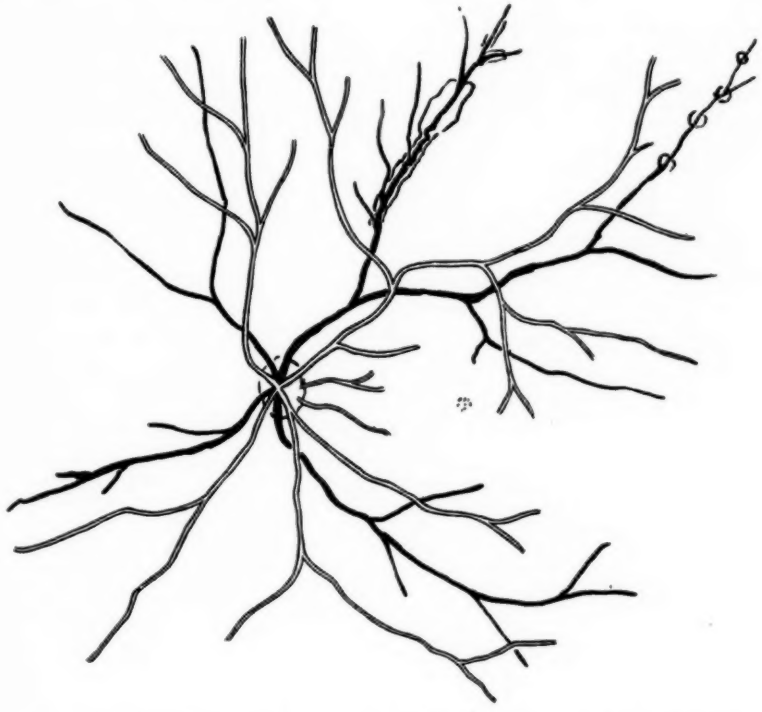

Fig. 2 (de Ocampo). Fundus of the left eye at time of patient's discharge, May 10, 1941.

lesion was vascular and localized in the branches of the superior temporal vein. The retinal hemorrhage seemed to be secondary to this vascular lesion. It could not be due to the anemia which the patient might have had to a slight degree in the beginning, for the fundus of neither eye showed evidences of anemia.

Eales's disease might be considered, but this was the first occurrence of retinal hemorrhage.

What could be the pathologic condition of the two branches of the superior temporal vein? Thrombosis was the first consideration. From the appearance ophthalmoscopically, the lumen of the superior branch was completely obliterated throughout its course, while that of the lower branch only in segments. In addition to this, the whitish streak replacing the lumen of the vein was two to three times wider than the lumen. In this connection, it is well to remember that what one ordinarily sees ophthalmoscopically is the blood column, the blood-vessel wall being transparent. Thrombosis alone of one or two branches of the temporal vein would not result in this fundus picture.

Embolism of retinal vessels was not considered because a retinal vein and not a retinal artery was obliterated or obstructed.

What could be the condition then? Since the lumen, the wall, and probably the retinal tissues surrounding the wall of the vein were involved, it was probable that the pathologic condition more nearly approximated periphlebitis and phlebitis retinae. Panphlebitis[3] retinae may also be offered as a terminology. In fact, Ballantyne and Michaelson,[2] in reviewing the literature on the subject, have found that the terms vasculitis, perivasculitis, phlebitis, endophlebitis, and periphlebitis have been employed by various writers. That it was inflammatory and not degenerative (phebosclerosis) or neoplastic was shown by the rapid onset and the course of the disease with almost complete recanalization of the lumen of the vein after about five to six months. Formation of new venous channels was thought to have been seen by some members of the staff of the department about two months after the onset. Further observation and follow-up, however, showed that a blood column was being formed along the course of the occluded vein. Apparently this was through the occluded lumen of the vein, especially seen more clearly in the lower segments through its beaded portions. Although formation of new vessels seemed to have occurred at the periphery of the upper branch, this did not help in the process of reëstablishing the circulation through the vein. This recanalization of the phlebitic lumen is possible if different pathologic conditions are taken into account. Coats, cited by Moore,[4] showed a histologic section with complete canalization of the central vein following its thrombosis. Duke-Elder[1] states, when referring to its pathology, "The affection usually starts in the peripheral vessels, although quite frequently in the larger branches, and the veins are more usually affected than the arteries or capillaries. The primary condition is essentially a periphlebitis. In the more acute lesions, the infiltration is of polymorphonuclear cells; in the more chronic or later lesions, it becomes mainly mononuclear, consisting of lymphocytes, sometimes with epithelioid cells. At first the cellular infiltration is seen within the vessel wall limiting itself to one part in the early stages but rapidly becoming vascular, until eventually it obliterates the lumen. At other times, there is proliferation of the endothelium and at yet other times the exudative cells themselves invade the lumen of the vessel directly occluding it."

I presume that this latter process must have taken place in my case. This will also explain the recanalization of the veins in five months, after the exudative cells had been absorbed instead of being converted into fibrous tissue.

What is not certain in this case is the etiology. Although the tuberculin test with 0.5 mg. O. T. gave a positive cutaneous reaction, the focal retinal reaction was doubtful. The recovery of the patient may, however, have been influenced by the tuberculin treatment instituted. This was given after other specific and nonspecific causes such as focal infection, amoebiasis, parasitism, syphilis, and anemia, had been remedied or ruled out. Perivasculitis of the retina, according to Duke-Elder, is not the clinical expression of a single disease but a clinical manifestation common to many infections. The course of the phlebitis in this case while more in favor of a nonspecific classification is not entirely against a tuberculous etiology. There were, moreover, no evidences of thromboangiitis obliterans[5, 6] in other parts of the body, with which some authors have associated this retinopathy. The affection of the retinal veins in the left eye seemed to be a local condition and not a part of a general affection, vascular, hematologic, or otherwise.

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VITAMIN THERAPY IN OPHTHALMOLOGY*

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The progress made in the treatment of human ailments by vitamin therapy has been astounding. Every conceivable claim has been made for it, and, strangely enough, the introduction of the vitamins has worked profound changes in our knowledge of nutrition. When Osborn and Mendel[1] in 1913 observed ocular inflammation repeatedly in the albino rats deprived of vitamin A in the diet, I[2] was asked to study the clinical phase of this disease. It was apparent, from these studies, that the ocular condition observed in the albino rats nurtured with a diet lacking vitamin A was comparable to that recognized by the ophthalmologist in humans as xerophthalmia and keratomalacia. Although various types of feeding experiments were conducted in the Connecticut Agricultural Station, not one of the other groups of animals developed the ocular disturbances observed in those fed a ration deficient in vitamin A. However, it was noted that the ocular disturbances, xerophthalmia and keratomalacia, appeared more rapidly in the animals deprived of vitamin A when the ration was also inadequate in either the vitamin-B group or some of the minerals. It was our[3] first impression that the lack of vitamin A in the diet lowered the resistance of the tissue so that a secondary infection invaded the ocular tissue, but Wolbach[4] and his associates maintained that it was really a keratinization of the epithelium that was obtained by the lack of vitamin A in the diet of these animals.

These experiments also revealed that vitamin A was necessary for the normal growth and well being of the experimental animal. Further investigation showed that vitamin A was present in the retina and was necessary for the formation and regeneration of the visual purple.[4, 5, 6, 7] It was evident to the clinician and to the investigator in nutrition that the eyes were of considerable value in estimating the vitamin-A content of the body. Although the methods now available, such as the measurement of dark adaptation and analysis of the vitamin-A content of the blood, are neither accurate nor adaptable for all persons, they are, nevertheless, an advancement in the right direction. When a synthetic vitamin A becomes available further progress may be expected in vitamin-A research and therapy.

Carotene, known as provitamin A, has been recommended as a substitute in instances in which large amounts of vitamin A are required and the patient cannot tolerate fish oils. It is believed that carotene is converted into vitamin A in the liver, and if the liver cells are injured the conversion of carotene into vitamin A is impaired. Likewise in xerosis of the liver and in some disturbances of the liver parenchyma, carotene may be poorly converted into vitamin A, and the storage of vitamin A and its precursor, carotene, is impaired. It is apparent that vitamin A in the form of fish oil is the logical medium for vitamin-A therapy.

Experimental and clinical investigations have shown that several of the known factors of the "B vitamins" have a specific field of usefulness. There is much evidence to support the opinion that some of the vitamin-B factors are important for normal intestinal function of animals. The complete number of individual factors composing the group is not yet

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known. However, rapid progress has been made in the process of breaking down the B group. Already five components of the group—thiamin, riboflavin, pyridoxin, nicotinic acid, and pantothenic acid—have been synthesized and are now sold under various "trade names."

It is evident from the literature that thiamin hydrochloride is of value in converting and preventing anorexia of dietary origin, in securing optimal growth of infants and children, in cardio-vascular dysfunction caused by vitamin-B deficiency, in correcting and preventing beriberi, and is essential for the oxidation of pyruvic acid, an intermediate product in carbohydrate metabolism.

The second in the vitamin-B group, known as riboflavin (lactoflavin, vitamin G, vitamin B_2), is considered exceedingly important in tissue-cell activity. It combines with phosphoric acid and a protein of the cell to form an enzyme that is essential for tissue oxidation. Riboflavin (vitamin-G) deficiency in rats is characterized by retarded growth and general debility. The animal is so sick that it cannot take care of its fur sufficiently enough to free it from vermin.[7] Associated with these lesions are inflammations of the ocular tissue, such as mucopurulent conjunctivitis, vascular keratitis, and lenticular changes (cataracts). These disturbances have not been found consistently by all observers but frequently enough by many to demand serious consideration. The several pathologic disturbances caused by the riboflavin deficiency were alleviated in many instances by supplementing the missing factor, riboflavin; the exception to this improvement was the changes in the lens tissue, for they remained unaltered (cataractous).

The role of riboflavin in human nutrition is not well understood, except that it is associated with cell respiration. The signs and symptoms of riboflavin deficiency are at times difficult to distinguish from those accredited to the vitamin-B group. Spies[9] and others have described in detail certain lesions at the corners of the mouth (cheilosis), erosions around the eyes, and a roughened desquamating condition of the sides of the nose, which rapidly disappeared when riboflavin was administered. They also observed that ocular symptoms including photophobia, dimness of vision, and extreme visual fatigue were frequently common manifestations of riboflavin deficiency. The earliest and most prevalent sign of ariboflavinosis was circumcorneal injection, with actual invasion of the cornea by capillaries arising from the limbus.

Like thiamin chloride, riboflavin is necessary for the normal increase in growth, weight, and appetite in the experimental animal, and when it is administered with thiamin chloride it seems to increase the effectiveness of the latter. A similar action has been noted with respect to nicotinic acid. Nicotinic acid and nicotinic acid amide known as (P*P) Factor are effective in the treatment of human pellagra and cure of black tongue in dogs. Recently it has been observed that the amide is a better substance to use, for it can be given in large amounts without inducing the peripheral vasodilation which equivalent amounts of nicotinic acid often cause.

There are several other components of the vitamin-B group that are essential for the maintenance of normal growth and health of the laboratory animal and possibly man, but they seem to have no specific effect on the ocular tissue.

Vitamin B_6 or pyridoxin has been recommended in the treatment of some phases of Parkinson's disease, and in certain cases of pellagra that do not respond fully to nicotinic-acid therapy. The filtrate factor known as pantothenic acid is useful

in animal nutrition. Further investigation may reveal that the last two synthetic substances have some value in human nutrition. It is evident that even after feeding synthetic vitamins—thiamin, riboflavin, pyridoxin, nicotinic acid, and pantothenic acid—the animals do not thrive on one or all of them but require the whole vitamin-B group. It is thought by many clinicians and research workers that the best therapeutic response is obtained by the use of the vitamin-B group from natural sources, such as yeast, liver, and some grains.

Vitamin C plays a very important role in maintaing human and animal development. As early as 1795, it was known to have been used in the form of lemon juice by the British Navy to control scurvy. Although typical cases of scurvy are rare in this country, the subclinical form of vitamin-C deficiency has been reported frequently enough so that it behooves the general practitioner to be ever watchful for it. In health, vitamin C is absorbed almost entirely from the intestinal tract. A plasma level of vitamin C of about 1.2 mg. percent is considered sufficient for the physiologic function of certain essential body processes, such as maintaining a normal production of intercellular substance associated with collagen formation, and the production of nonepithelial cement substances including that of the vascular endothelium. A deficiency of this essential factor has been noted in anemias, hemorrhagic diseases, and during and following infectious disturbances. Vitamin C can be stored in the body to a limited extent in the adrenal cortex, liver, and intestinal walls. It has been shown to exist in the aqueous humor of the eye and in the lens tissue in quantities sufficient to bring forth speculation as to its existence there.

Vitamin C is a strong reducing agent and thus has been credited with playing a part in the respiration of the lens tissue. This hypothesis cannot be accepted, for there is not sufficient evidence, clinical or experimental, to substantiate it. Nevertheless, I, for one, advocate the use of vitamin C either from natural sources or the synthetic product, cevitamic or ascorbic acid, in conditions in which the blood stream is abnormal or the blood vessels pathologic. It has been suggested that vitamin-C deficiency be considered if there are general weakness, tender joints, defective teeth, and when fractured bones do not knit well. It is difficult to state what the daily requirements of vitamin C are. It is important to know what the international standard of vitamin C is. One milligram of ascorbic acid is equal to 20 international units of viatmin C. It has been estimated that an ounce of lemon or grapefruit juice contains 350 international units. Several clinical, physical, and chemical tests have been advocated for the determination of vitamin C but they are not entirely satisfactory for the examination of body fluids.

Early in the study of the vitamins it was evident that vitamin D in cod-liver oil was effective in preventing and controlling rickets. There is a close association of vitamins A and D in nature. Vitamin D has been used in the treatment of many ocular disturbances. Myopia and keratoconus seem to have received the greatest attention. The results obtained in these conditions are variable. Vitamin D is valuable in the prevention and cure of infantile rickets, spasmophilia (infantile tetany), and osteomalacia. The vitamin is also associated with calcium and phosphorus metabolism. It is essential to bone growth and tooth formation.

With the introduction of the vitamins in medical therapy, many of the ocular disturbances observed, particularly in infancy and early childhood, have disappeared. Outstanding among these con-

ditions is phlyctenular keratoconjunctivitis, which has almost entirely vanished from ophthalmic practice. Xerosis conjunctivae, frequently encountered in children suffering from some form of debilitation associated with gastrointestinal dysfunction, is no longer common. The blepharitis and hordeola, so often observed in convalescence of measles, chicken pox, and other exanthemata, are less frequent, for children are now treated with large doses of vitamin-A and the vitamin-B groups. We still have the highly emotional child who will not eat a well-balanced diet and the anxious parent who tries to supervise the process of eating by means of strong-arm methods instead of turning the child over to some member of the family who is more patient. Children frequently resent their treatment because of the remarks of dislike for the medicine made by a fond parent. Ocular manifestations of a subclinical vitamin deficiency may be expected in this group. If the children are of the blond type the disturbance is more aggravated. I do not believe that blepharitis ciliaris and inflammations of the meibomian glands encountered in youth and middle ages are produced because of the lack of a single vitamin, but are usually manifestations of a lowered resistance of the whole body. Some authors have cured the symptoms associated with vascularization of the conjunctiva and cornea with large doses of riboflavin. The pharmaceutical companies are very much impressed with these miraculous cures.

Recently the issue has been raised as to whether myopia is produced by a deficiency of vitamins A and D in the food. The evidence presented in favor of this hypothesis is not very impressive from the standpoint of one who has had some experience with experimental investigation. The data used to show the similarity of ocular disturbances produced in the albino rat on an inadequate vitamin-A diet, and myopia and keratoconus in man, cannot be accepted without further well-regulated experimental investigation. I realize that many other conditions, such as pellagra and pernicious anemia, which were not regarded as disturbances of a deficiency disease, are now considered in that category. I do not object to the use of vitamin therapy in myopia and keratoconus, but dislike the *post hoc procter hoc* method of reasoning. Vitamin D and calcium in large doses has been advocated for these conditions, but I have been unable to obtain any favorable results with this therapy. I maintain that harm may be produced by the use of large doses of vitamin D and calcium if the practitioner is not in a position to examine the rest of the body.

After reading the favorable report by de Grosz[10] on the local use of vitamin-A preparations in ophthalmic practice I procured an ointment and an oil mixture having a potency of about 1,200 U.S.P. units of vitamin A per gram. They were used as recommended for lid injuries, corneal abrasions, phlyctenular keratoconjunctivitis, and corneal ulcerations. The results were not at all impressive. I repeated the treatment in a new group of patients with an ointment, prepared by Squibb's, having a potency of 2,000 units per gram. This investigation is still active but as far as I have gone, the results are not too favorable. I[11] reported the same unfavorable results when I used vitamin-A preparations locally in animal experimentations. Like many other ophthalmologists, I observed that some types of herpetic disturbances of the cornea, keratitis profunda, marginal ulcers, and catarrhal ulcers healed more rapidly when vitamin A in the form of fish-liver oils or their concentrates was given in addition to local ocular therapy. I have prescribed the fish oils and their concentrates orally

over a period of 20 years to many young and old patients afflicted with phlyctenular keratoconjunctivitis and xerosis conjunctivae with favorable results. Frequently, a patient is told to take a quantity of cod-liver oil daily or a few pills or capsules of vitamin A, B, C, D, and E without being instructed that the best product available may not be potent enough to cure the ocular condition.

I usually tell the patient that vitamins should always supplement a well-balanced diet. If the appetite is poor it should be corrected by proper medical treatment. Cathartics should not be used too freely if adjustment of the dietary habits can restore the normal gastro-intestinal activity. Hepatic disturbances may lead to retarded absorption of the fat-soluble vitamins. It must, therefore, be corrected. Nervous manifestations, particularly in persons of the spastic emotional type, may be accompanied by anorexia and disturbed metabolism. It is all important to have the patient understand that a disturbance in some other part of the system may produce pathologic changes in the ocular tissues that may terminate in a diseased condition. I always advise the patient to report to the family doctor for general check-up when these ocular disturbances are present. If there is any history of gastro-intestinal pathology, particularly a liver dysfunction or chronic colitis, I advocate the use of the vitamin-B group in the form of potent brewer's yeast or its concentrate. It is not unusual to cure a persistent asthenopia with blepharospasm and photophobia as the main symptoms with vitamins A and the B group. It is important that the patient follow the instructions explicitly, if favorable results are to be obtained. Nothing must be taken for granted. Explain to the patient or family why each ingredient is being prescribed. A good understanding between the patient and physician is important. Give the patient a sedative when necessary. When the patient is turned over to the family physician for general treatment make certain that he also is instructed properly about the ocular condition.

Retinitis pigmentosa has been treated by every known form of local and general therapy, but cure of the ocular condition is far from being satisfactory. I recommend from experience with this progressive atrophic disturbance of the choroid and retina large daily doses of not less than 20,000 units of fish-oil concentrates, together with a tablespoonful of potent brewer's-yeast powder or its concentrate. I also advise that the citrus fruit juices should be added to the diet of these people. If the condition is observed early, favorable results may be obtained. Do not expect cures until the etiology of the retinitis pigmentosa is known.

I[12] have reported several dramatic cures of corneal ulceration in individuals about 45 to 70 years of age. The lesion usually begins with a slight irritation of the eyeball, and frequently the patient complains of a foreign body scratching the eye. An examination of the tissue in the early stage of the disturbance reveals no pathology, but a few weeks later a slitlamp examination shows increased vascularization of the limbus and a breaking down of the cornea. The nerve elements in the cornea appear more prominent. Frequently this process may terminate in a frank catarrhal ulcer and even a ring ulcer of the cornea. The patient has symptoms of anorexia, increased fatigability, sleeplessness, and headache. There is a tendency toward apprehension, depression, and in some cases the development of anxiety neurosis. Local therapy does not relieve the symptoms. Many ulcers of the cornea that have no definite etiology are associated with some form of deficiency lesion. I have supplemented

the ocular treatment with parenteral injections of 25 mg. thiamin chloride daily for one week and have given two heaping tablespoonfuls of potent brewer's-yeast powder. If the latter could not be tolerated the concentrate was given. Those patients who carried out instructions or were confined to bed at the hospital were cured within two or three weeks.

Nonexperimental interstitial keratitis in the dog has been cured by the addition of vitamin A and the B group to the diet. I[13] also reported the rapid disappearance of interstitial keratitis in two patients known to be syphilitic by the use of a tablespoonful of cod-liver oil, morning and night, and a tablespoonful of yeast powder at noon. The ocular condition disappeared within two months' time. This does not necessarily mean that specific treatment for interstitial keratitis should be discarded, but it is significant that the ocular condition may clear up if a well-balanced diet is added to the local and general treatment for syphilis.

All types of optic neuritis have been treated with the vitamin-B group as a whole and by the single synthetic factors. Retrobulbar neuritis, particularly that associated with multiple sclerosis, seems to show the most spectacular return of vision. I also have obtained such results, yet I am skeptical, for retrobulbar neuritis has been acclaimed as cured only to find an acute exacerbation of the condition. I advocate parenteral injections of thiamin chloride, 25 mg. daily for several weeks, and the oral administration of at least two heaping tablespoonfuls of potent brewer's-yeast powder or its concentrate equivalent. It is important that a well-regulated diet be consumed by the patient.

Toxic amblyopia produced by tobacco and alcohol has been cured promptly, if atrophy has not been established, by the B group when it is supplemented by a well-balanced diet. The use of alcohol and tobacco should also be curtailed. Before, long some factor of this group may be accredited for the rapid restoration of color fields and visual acuity, but until then it is necessary to use the whole group for the treatment of toxic amblyopia.

I[14] am gratified with the results obtained with hemorrhages in the vitreous and hemorrhagic chorioretinitis by the use of natural vitamin C supplemented by ascorbic acid. Two hundred milligrams of ascorbic acid is given daily as a supplement to the juice of four or five lemons. It is important to give these patients a sedative, and I find that bromides are very helpful. The family doctor should be instructed about the ocular damage and how to treat it. Naturally you cannot expect restoration of sight if the tissue is damaged by pressure or anoxemia. Occasionally, an edema of the macular region is encountered in persons having early arteriosclerosis and an irregular heart. The central vision is usually affected so that the patient becomes very much alarmed. I have obtained good results with 300 to 500 mg. of ascorbic acid and the juice of at least six lemons daily. Hemorrhages associated with thrombosis of the veins are not amenable to the therapy.

I have observed a group of patients who are not of the blond type suffering from photophobia and asthenopia when exposed to the sun or artificial light. Their skin does not burn when the body is exposed to the sun. Frequently they give a history of liver disturbance or some form of gastro-intestinal dysfunction particularly a chronic colitis. Some give no history of recent gastro-intestinal tract disturbance, but the fundi present typical and atypical forms of retinitis punctata albescens, and invariably, when questioned, they will recall instances of poor nutrition or severe illnesses previous to puberty. These patients will improve and thrive on a com-

bination of mixed vitamins, provided sufficient amounts of the B group are included.

A discussion of vitamin therapy in ophthalmology would not be complete without mentioning the treatment of lenticular changes before the lens protein has been altered by the invasion of substances that interfere with the lens metabolism. For nearly nine years, I[15] have treated the tumescent stage of the lens by correcting the dietary habits of the patient. I have observed that if the protein content is about normal, and the diet is sensible, the vacuoles underneath the lens capsule seem to disappear and the visual acuity improves. If the appetite is poor, I give the patient 5 mg. of thiamin chloride orally and a tablespoonful of potent brewer's yeast powder daily and recommend a well-balanced diet with plenty of lemon, orange, and grapefruit juices. The clinical study has been too short and the series too small to allow of a conclusion about this therapy.

I can say with all frankness that my elderly patients feel much better with this general care; some of them return to work and others seem to gather a new lease on life. If this dietary regime does not eliminate the early lens changes, it improves the general health of this group to the extent that it should be used more frequently.

Conclusion

Throughout the discussion, no mention was made of any specific form of vitamin and I avoided speaking about the recent miraculous cures of ocular disturbances by factors of the vitamin-B group. These results have not been repeated by enough clinicians to warrant their general use in ophthalmic practice. The vitamin-B group may be obtained in concentrated form if the patient objects to brewer's-yeast powder. The fish-oil concentrates may be substituted for cod- or halibut-liver oils. There is, however, no substitute for a well-balanced diet.

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MUSCLE IMBALANCE IN MYOPIA*

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During the past 5 or 10 years there has been an increasing interest in the subject of orthoptics which has served to emphasize the importance of the binocular functions and has brought about a new concept of the mechanisms governing these functions. Let me repeat the phrase "new concept" because it is only the concept that is new. As Lancaster[1] stated before this Society last year, the basic principles underlying the ocular movements rest upon such well-established laws as those of Hering and Listing; upon Sherrington's ideas of the function of the nervous system; and upon Pavlov's elucidation of conditioned reflexes. Unfortunately, the ideas set forth by these workers have not been clearly applied in our studies of the ocular movements, with the result that our thoughts on the subject have been clouded with the mechanistic ideas that emphasize weakness or strength of individual extraocular muscles and that minimize or overlook entirely the neurologic or reflex portion of the mechanism, which is the most important factor.

Being interested in orthoptics and also in myopia, I began, about two years ago, to study my myopic patients from the viewpoint of the orthoptist. That is, in addition to measuring the phorias in the conventional manner, to investigate and to attempt to classify the anomalies of the binocular reflexes that were observed while the eyes were under the influence of fixation, fusion, and accommodation. The first thing which I discovered, as had others (Snell,[2] Marlow[3]) before me, was that a large majority of myopic patients have either an esophoria or an exophoria that is greater than normal. Next, I discovered was that these myopic patients who are either esophoric or exophoric demonstrate abnormalities in their convergence-accommodation relationships. I also found that these abnormalities were of two different types or two different patterns, one pattern being associated with esophoria, the other pattern with exophoria. Hyperphoria also was present in a large majority of these patients, occurring with about equal frequency in each pattern and, so far as I have been able to determine, exercising no influence upon either pattern. I am, therefore, eliminating hyperphoria from any further mention in the present discussion.

A series of 50 cases has been studied. No attempt has been made at selection, with the exception that no cases of the higher degrees of myopia have been included and no presbyopic patients have been included.

The youngest patient examined was 8 years of age, the oldest 38. Thirty-eight of the 50 patients studied were between the ages of 10 and 30. The smallest amount of myopia present was 0.50 diopter; the largest amount 6.00 diopters. Thirty-three of the patients had between 1.00 and 4.00 diopters of myopia. In 45 cases the refractive error was predominantly spherical, and in 5 cases it was predominantly cylindrical. It may be stated, therefore, that we are dealing here with an adolescent or young adult person whose myopia is in the amount of about 1.0 to 4.0 diopters and whose refraction is predominantly spherical.

* Read before the Pacific Coast Oto-Ophthalmological Society, May 28, 1941.

Methods of examination. Instruments used were the phorometer, synoptophore, and rotoscope. All measurements of phoria were checked by two methods: (1) Maddox rod and (2) method of dissociation of images. In no case did the different methods show a different type of phoria, but the second method usually showed a higher amount of phoria. The prism vergences were measured with all three instruments, but most of the measurements were made on the rotoscope because it is the most convenient for this type of work. The following data were recorded:

(A) Tests made at distance.
  (1) Measurement of phorias.
  (2) With the patient fixating a test object consisting of small print, the amount of prism, base-out, was increased until the print became blurred (point of accommodative blur).
  (3) The amount of prism, base-out, was increased until diplopia occurred (point of break).
  (4) The amount of prism, base-out, was reduced until single vision was restored (recovery point).
  (5) With same test object (print), the amount of prism, base-in, was increased as in (2), (3), and (4). No point of accommodative blur was noted (2), but the point of break and the recovery point were recorded.

(B) Tests made at near-point.
  (1) Measurement of phorias.
  (2) With patient fixating a test object consisting of small print, the same tests were repeated with prism, base-out, and prism, base-in, as was done for distance.

Of the 50 patients examined as outlined above; six (12 percent) were found to give reactions that were considered to be within the limits of normal. Twenty (40 percent) were classified as esophoric and 24 (48 percent) were classified as exophoric.

The esophoric group showed the following pattern: The esophoria was always less for near than for distance. The physiologic exophoria was always less than normal. When tested with increasing amounts of prism, base-out, at distance, the accommodative blur occurred late or not at all. The point of diplopia was greater than normal and the recovery to single vision was prompt when the prism power was reduced. When tested at distance with increasing amounts of prism, base-in, diplopia occurred early and recovery was poor, often requiring a reduction of the prism power to zero or to the phoria position. When the esophoric patients were tested at near-point, with prism base-out, it was found that large amounts of prism, base-out, were required to produce blurring or diplopia, and recovery to single vision was prompt. Small amounts of prism, base-in, caused diplopia with correspondingly poor recovery. I consider the essential points in this pattern to be the following: (1) With the patient fixating at distance, a large amount of prism, base-out, was required to cause an accommodative blur. That is, the patient had the ability to converge without accommodating. (2) Physiological exophoria was less than normal. (3) Small amount of prism, base-in, at the near point caused blurring and diplopia. These latter data indicated that the patient was unable to accommodate without converging.

From these points I draw the conclusions: (1) that the myopic patient who

is esophoric has a close accommodation-convergence relationship and a loose convergence-accommodation relationship; (2) that such a patient cannot accommodate without converging, but that he can converge without accommodating. Or, to state it differently, when this patient accommodates, his convergence is immediately and actively called into play; but when this patient converges, his accommodation is not immediately and actively called into play.

The exophoric group showed a pattern that, as might be expected, was exactly the opposite. The exophoria was always greater for near than for distance and the physiologic exophoria was always greater than normal. When tested with increasing amounts of prism, base-out, at distance, the accommodative blur occurred early and was very marked. This was one of the most striking findings in the entire study. As a matter of fact, all of the findings in the exophoric group were more definite and more constant in their manifestation than the findings in the esophoric group, and it is my belief that exophoria has a more marked influence upon myopia than does esophoria. As the amount of prism, base-out, was increased, diplopia occurred early and recovery to single vision was late. When the test was at distance with increasing amounts of prism, base-in, there was no blur, and diplopia occurred late. Reducing the amount of prism, base-in, gave prompt recovery to single vision. When the exophoric patients were tested at near-point, with prism base-out, a small amount of prism, base-out, produced blur; diplopia occurred early and recovery to single vision was poor. When the test was at near-point, with prism base-in, there was no blur; a large amount of prism, base-in, was required to induce diplopia, and recovery to single vision was prompt. I consider the essential points in this pattern to be the following: (1) With the patient fixating at distance, a very small amount of prism, base-out, causes a definite and marked accommodative blur. This indicates that the patient is unable to converge without accommodating. (2) The physiologic exophoria is greater than normal. (3) At near-point, large amounts of prism, base-in, can be tolerated before diplopia occurs. These latter points show that the patient can accommodate without converging.

From these points I draw the conclusions: (1) that the myopic patient who is exophoric has a close convergence-accommodation relationship and a loose accommodation-convergence relationship; (2) that such a patient cannot converge without accommodating, but that he can accommodate without converging. Or, to state it differently, when this patient converges, his accommodation is immediately and actively called into play; but when he accommodates, his convergence is not immediately and actively called into play.

It is interesting to note that myopic patients rarely complain of eye discomfort notwithstanding the fact that a high percentage of them have definitely abnormal muscle balance. A few, however, do have difficulty. Several patients, both of the esophoric and exophoric types, have been studied and treated, and uniformly good results have been obtained from orthoptic treatments designed to correct the anomalies found. In treating the exophoric types of eyes, some concern was felt over the possibility of causing an increase in the myopia by the type of treatment required; namely, treatment designed to increase the convergence power at near-point. It was found, however, that these patients could be trained to converge without accommodating and that their myopia, which had formerly been progressive, became stationary during the period of treatment. Several writers have

expressed their opinions concerning the relationship of ocular-muscle imbalance to the progress of myopia. Those who stress the mechanical (elongated-globe) theory of myopia have written concerning the mechanical effect which the tensions of muscle imbalance may have upon the eyeball (Jackson,[4] Marlow,[3] Snell[2]). Others, who incline toward the belief that myopia frequently rests upon a functional rather than a mechanical basis, believe that a variation in the accommodative mechanism produces what may be termed a "functional" myopia and believe that the accommodative mechanism may be directly influenced by the status of the muscle balance (Pascal,[5] Luckeish and Moss,[6] and Prangen[7]).

In an effort to determine whether or not correction of muscle imbalance might have a favorable influence upon the progress of myopia, I selected certain patients who indicated a willingness to coöperate in an experimental procedure and have kept their ocular condition under observation for a period of time. It was not possible to treat a large group, and some of those who began the work did not follow through, so that there are only nine patients on whom I have complete records. Eight of the nine had been previously under my care, and their myopia had been progressing until the time when treatment was started. The ages ranged from 10 to 19 years, and the amount of myopia from 1.50 to 6 diopters. Two of the patients have been under treatment and observation for a period of nine months; four for a period of one year; and three for a period of two years. I will not here attempt to give a detailed description of the methods of treatment, but the underlying principles have been: to correct the abnormal convergence-accommodation relationship (for example, in the exophoric type to train the patient to converge without accommodating); to shift the abnormal exophoria or esophoria toward normal; to attempt to stimulate and develop the negative phase of accommodation. None of the patients have shown any increase in the amount of their myopia during the period of time they were under treatment and observation. Neither has there been any definite reduction in the amount of myopia in any case, although there was frequently an apparent reduction. That is, in the case of patients who demand 20/20 distance vision, it is often necessary to prescribe lenses slightly stronger than the correction that produces 20/20 vision under atropine. After treatment, it will be found that these patients can obtain 20/20 vision with their atropine correction, and the strength of lenses which they wear can be correspondingly reduced. I have been unable, in any case, even after one or two years' treatment, to obtain for them 20/20 vision with a weaker lens than that required at the original atropine refraction.

It is not the purpose of this paper to recommend a treatment for myopia, but rather to call attention to the fact that a high percentage of myopic patients have an abnormal muscle balance; and to outline the types of abnormal relationship that exist. However, the fact that the progress of the myopia ceased in all cases in which the muscle imbalance was corrected by orthoptic treatment leads me to believe that this type of treatment is of definite value in the control of the common type of functional myopia seen in children and young adults.

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CULTURAL STUDIES ON PATIENTS WITH UVEITIS AND OTHER EYE DISEASES*

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The present article is a report of cultural and immunologic studies made during the past four years on 142 patients with acute or chronic ocular lesions, in an attempt to isolate an etiologic agent. Sixty-three patients had either acute or chronic uveitis, and 65 suffered from other inflammatory eye diseases, including 28 cases of chorioretinitis, 16 of keratitis, 6 of endophthalmitis, 9 of conjunctivitis, and 5 of optic neuritis. Control studies were also made on 14 patients with noninflammatory eye diseases.

During the period of this investigation 83 patients with active rheumatoid arthritis and 22 with rheumatic fever were also studied.[1]

According to numerous investigators, uveitis and rheumatoid arthritis or rheumatic fever occasionally occur in the same individual, and, since the etiology of these diseases is not known, an attempt was made to determine whether any relationship could be established between these conditions.

THE RELATIONSHIP OF UVEITIS TO RHEUMATIC DISEASES

de Schweinitz[2] reported that uveitis was rarely associated with acute articular rheumatism, but that it was more common in the chronic forms. Bauer[3] found that uveitis was present in 7 of 150 patients with rheumatoid arthritis, an incidence of 4.7 percent, whereas Cecil and Angevine[4] observed 3 instances of uveitis in 200 cases, or 1.5 percent. In a series of 162 cases of rheumatic fever, Coburn[5] found only one case of uveitis. Dawson[6] reported having seen uveitis in conjunction with rheumatoid arthritis, and Swift[7] encountered it with rheumatic fever, but gave no figures.

Uveitis was not observed in any of the rheumatic-fever cases in our series, but in 2 of 63 patients with uveitis, and in 2 of 83 patients with rheumatoid arthritis, both diseases were present, an incidence of 3.2 and 2.4 percent, respectively. To make certain that only true cases of uveitis were reported, it was necessary that keratitic precipitates, cells

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in the anterior chamber, and other clinical signs be present.

From these observations it appears that if one adheres closely to accepted standards in making a diagnosis of ocular or rheumatic diseases, the association of uveitis with either rheumatoid arthritis or rheumatic fever is relatively infrequent.

Blood cultures

Traut,[8] using the clot method of Clawson,[9] isolated pleomorphic streptococci from the blood of five patients with acute iritis; he also found similar organisms in the blood of patients with chronic infectious or rheumatoid arthritis. Brown[10] was unable to repeat these findings, although he used the same technique in making cultures of 81 specimens of blood taken from patients with uveitis. Only two of the cultures contained organisms, in both of which instances these were streptococci. Their exact nature was not determined. One positive culture was recovered from a patient with panophthalmitis following a septic abortion, the other was taken from a patient with chronic uveitis complicated by pyelitis. Brown attached little importance to these positive findings, since both patients had infections in sites other than the eye.

In the cultural studies reported here the tests were made in a dust-free, air-filtered room. All transfers of cultures were made with rubber bulbs on the pipettes, in order to lessen the danger of contamination, and masks were worn by the workers. Both the aërobic-clot and direct methods were used. The culture media consisted of dextrose phosphate broth and saponin broth. The cultures were kept for 30 days, and, for the most part, the tubes were not opened until the end of this period unless the contents appeared to be turbid and suggested bacterial growth.

Seventy-six cultures were made on 71 patients, 43 of whom had uveitis and 28, other inflammatory eye conditions (table 1). In only two instances were bacteria found—a hemolytic Staphylococcus albus in a case of uveitis, and a nonhemolytic Staphylococcus albus in a patient with chorioretinitis. The bacteria, however, were not agglutinated by the sera of the patients from whom they were isolated, and, as both organisms are frequent laboratory or skin contaminants, no significance can be attached to them.

TABLE 1

BLOOD CULTURES FROM PATIENTS WITH UVEITIS AND OTHER EYE DISEASES

	Number of Patients	Number of Cultures	Results	
			No Growth	Growth
Uveitis	43	47	42	1 (hemolytic Staphylococcus albus)
Other inflammatory eye diseases	28	29	27	1 (nonhemolytic Staphylococcus albus)
Total	71	76	69	2

Cultures of anterior-chamber fluid

Since the aqueous humor bathes the anterior segment of the uveal tract, one would suspect that, if microörganisms were actively involved in nonspecific uveitis, they should be found in the fluid from the anterior chamber. However, Brown[10] was not able to cultivate any bacteria from 37 specimens of aqueous fluid from cases of chronic uveitis. In the present investigation, when possible,

the aqueous humor was aspirated, at the height of the exacerbation of the disease, with a 27-gauge hypodermic needle following anesthetization of the eye with 1-percent pontocaine solution. Usually 0.2 to 0.3 c.c. was obtained. The fluids were, as a rule, clear, but a few showed a slight opacity. Because of the small quantity of fluid, it was frequently found impossible to make cultures in more than one way. The following were used as culture media: dextrose phosphate broth, liver dextrose broth, blood dextrose broth, and saponin broth. Horse-serum and blood-agar plates were also used, and in several instances cultures were made anaërobically and under carbon dioxide. The cultures were examined daily for four days before they were discarded. Twenty-eight specimens of anterior-chamber fluid from patients with uveitis (table 2) were examined in this manner, and in no instance were any bacteria isolated. In addition, four specimens were cultured for pleuropneumonia organisms in 30-percent horse-serum agar, according to Klieneberger's[11] method. These cultures likewise showed no bacterial growth.

Cultures of the Nasopharynx

Because the portal of entry for bacterial agents of various infectious diseases is often through the respiratory and oral passages, it was deemed advisable to study the bacterial flora at these sites in an effort to find the infecting organism in inflammatory ophthalmic conditions. Dry sterile swabs were used to obtain culture material in the region high in the posterior pharynx. Material for culture was also obtained from patients by having them first rinse their mouths and gargle with 5 c.c. of sterile broth, which was ejected into a sterile Petri dish. The material was inoculated on horse- or rabbit-blood-agar plates, and examined at 24- or 48-hour intervals. Thirty-five patients with uveitis, 54 with other inflammatory eye conditions, and 14 with no inflammatory eye diseases were examined in this way. The flora was found to be essentially the same in all the groups. The predominating organisms were: Staphylococcus albus, Streptococcus hemolyticus, Streptococcus viridans, and gram-negative diplococci. These findings were compared with those from Topley and Wilson's[12] series of naso-pharyngeal cultures from normal adults. Streptococcus viridans, indifferent streptococci, and gram-negative cocci of the pharyngitis-sicca group were found to predominate. To determine whether the hemolytic streptococcus and Staphylococcus albus cultures isolated in this series would produce ocular lesions in animals, these microörganisms were inoculated intravenously into rabbits. It was observed that as high an incidence of ocular lesions was produced by the organisms from the control group of patients as from the patients with uveitis or other inflammatory ocular disease. Cultures of filtrates of nasopharyngeal washings from 12 cases, including 7 with uveitis, were examined for pleuropneumonialike organisms, grown on 30-percent horse-serum agar. In no instance were the organisms isolated.

TABLE 2

Cultures of Anterior-Chamber Fluid from Patients with Uveitis and Other Eye Diseases

	Number of Patients	Number of Cultures	Results
Uveitis	27	28	No growth
Other eye diseases	6	6	No growth
Total	33	34	

Attempts to isolate a virus from patients with uveitis

The possibility that an unknown virus might play a role in uveitis has often been considered, but supporting evidence has not been found. However, Woods and Chesney[13] reported the isolation of a virus from periodic ophthalmia occurring in horses, a disease similar in many respects to recurrent uveitis in man. Friedenwald and McKee[14] reported the isolation of a filtrable agent from the spinal fluid in a case of bilateral uveitis which, on intraocular injection into rabbits, dogs, and cats, produced lesions of the uveal tract. Because these observations suggested that a virus might be the causative factor in recurrent uveitis in man, studies for the isolation of such viruses were made on our series of patients.

The chorio-allantoic membrane of 8- to 10-day-old developing chick embryos was inoculated, according to Burnett's[15] technique, with the anterior-chamber fluid from 13 cases of uveitis and the filtered nasopharyngeal washings from two cases. Anterior-chamber fluid, nasopharyngeal washings, or conjunctival scrapings from seven patients with inflammatory eye diseases other than uveitis were cultured in the same manner (table 3). The membranes were collected after seven days' incubation at 37.5°C., and passed to other egg membranes in series for three passages. To make certain that the membranes were sterile, cultures were always made prior to further implantation. In no instance did material from the cases studied produce a transmissible lesion.

Aqueous fluid, nasopharyngeal washings, or conjunctival scrapings of 45 patients, of whom 20 had uveitis, were instilled into the nares of young white mice (strain CF1) under light ether anesthesia (table 4). In three of 62 mice inoculated with the nasopharyngeal washings of uveitis cases small areas of pneumonia developed after the first injection, and this occurred also in 2 of 80 mice which had received similar material from cases of inflammation of the eye other than uveitis. The pneumonia did not increase with passage. The anterior-chamber fluid and conjunctival scrapings produced no pneumonia in the lungs of mice on the first instillation nor on passage. Since the pneumonia developed so infrequently and so irregularly, it was assumed that the lesions were caused by the pleuropneumonialike organisms that we found in the lungs of normal mice or by a mouse virus.

TABLE 3

Cultural studies on chorio-allantoic membrane of developing chick embryos

	Number of Specimens	Number of Eggs	Number of Passages	Results
Uveitis				
Aqueous	13	45	3	Negative
Nasopharyngeal washings	2	6	3	Negative
Other inflammatory eye diseases				
Aqueous	1	3	3	Negative
Nasopharyngeal washings	2	6	3	Negative
Conjunctival scrapings	4	8	3	Negative
Total	22	68	15	

Agglutination and skin tests for undulant fever

Undulant (Malta) fever has been regarded as a cause of chronic uveitis by

many investigators, notably by Orloff,[16] who reported two cases of undulant fever with extensive ocular complications, and produced experimental keratitis, uveitis, and neuroretinitis in guinea pigs by inoculations with Brucella abortus. Green[17] also observed four cases of undulant fever, and collected from the literature 28 additional cases with such ocular conditions as keratitis, uveitis, retinitis, and optic atrophy. Because it is often difficult to make a clinical diagnosis in the subacute or chronic forms of undulant fever by isolation of brucella organisms, immunologic procedures, such as agglutination, intradermal or complement-fixation tests, and opsonophagic reactions are used. The interpretation of these tests has been clarified by Huddleson, Johnson, and Hamann,[18] and since the intradermal and agglutination tests are the most reliable for the determination of existing or previous infection, these tests were used in the present study.

Agglutination and intracutaneous tests were made on 25 patients with uveitis, 32 with other inflammatory eye diseases, and 6 with noninflammatory ocular lesions. Only one patient with chronic conjunctivitis had a positive agglutinin titer of 1:40; the intracutaneous reaction, however, was negative. Of 57 patients, 3 had positive skin tests, 2 with uveitis and 1 with endophthalmitis. These patients were known to have used raw milk in their diet. The fact that the large majority of tests were negative indicates that Malta fever did not play a significant role in this group of patients. However, most of the group were residents of a metropolitan area where only pasteurized dairy products are used.

TABLE 4

RESULTS OF INTRANASAL INOCULATION OF MICE WITH MATERIAL OBTAINED FROM PATIENTS WITH UVEITIS AND OTHER INFLAMMATORY EYE DISEASES

	Number of Cases	Number of Mice	Pneumonia After First Injection	Number of Passage
Uveitis				
Anterior-chamber fluid	3	25	9/0*	6
Nasopharyngeal washings	17	92	62/3	8
Other inflammatory eye diseases				
Anterior-chamber fluid	1	3	3/0	..
Nasopharyngeal washings	22	102	75/2	8
Conjunctival scrapings	2	5	5/0	..
Total	45	227	154/5	22

* Numerator = number of animals injected. Denominator = number of animals with pneumonia.

Discussion

Experimental iritis has been produced in animals by Rosenow and Nickel[19] and others. Because the organisms which produced the iritis in animals were isolated from foci of infection in patients with uveitis, it was believed that these organisms played an important role in the disease. Berens, Nilson, and Chapman,[20] on the other hand, were able to produce acute iritis in rabbits by the intravenous injection of cultures of bacteria isolated from the respiratory and gastro-intestinal tract of patients without ocular lesions, as well as from a group who had inflammatory eye diseases.

The observations made during this investigation also show that bacteria isolated from patients with no ocular disease will produce uveal-tract lesions if injected into rabbits. Cultures of hemolytic

streptococci, Streptococcus viridans, Staphylococcus albus, Neisseria catarrhalis, and Aerobacter aerogenes, which were isolated from the throat, nose, teeth, or blood of patients with uveitis, were inoculated into rabbits in doses ranging from 2 to 5 c.c. Of the 20 injected rabbits, 4 developed acute iridocyclitis. Organisms similar in type, isolated from patients without ocular disease, produced iridocyclitis in a larger number of instances; therefore, according to this procedure, the specificity of these organisms cannot be considered of importance in determining the etiology of uveitis.

Efforts to isolate a virus from human material by animal passage always give rise to the question whether the lesion observed was due to a spontaneous animal parasite or whether it was due to some agent from the patient. This point was emphasized by Andrews and Miller,[21] who isolated a virus from the testes of rabbits that had been injected with material from rheumatic-fever patients. Further experiments revealed the fact that the virus was present in normal testicular tissue. For the same reason Sabin[22] considered mice unsatisfactory for the isolation of filtrable pleuropneumonialike organisms from human material, since mice harbor these organisms normally.

Mice that were inoculated intranasally with material from cases of ocular inflammation developed pneumonia on serial passage. Using Klieneberger's special cultural technique, pleuropneumonialike organisms were grown from the lungs of these mice. However, the same organisms could be cultivated from the lungs of noninjected mice of the same stock.

Although the chorio-allantois of the chick embryo does not present this difficulty, lesions are often produced when sterile solutions or other material are implanted on the membranes. These lesions may be interpreted as the result of an infective agent, especially as they sometimes progress on passage. If a histologic study is made, however, a hyperplasia of the ectodermal and mesodermal layers will be found, which is a nonspecific response of the embryonic tissue to a foreign body.

It is, therefore, evident that great care is necessary in evaluating the significance of agents isolated by animal passage from human material.

Summary and Conclusions

1. Uveitis was observed in 2 out of a group of 83 patients with rheumatoid arthritis, and in a group of 63 patients with uveitis rheumatoid arthritis was observed in 2 instances, an incidence of 2.4 and 3.2 percent, respectively.

2. Eighty blood cultures were made on 75 patients. Forty-three were taken from patients with uveitis. In only two cultures were bacteria observed—a hemolytic Staphylococcus albus in a case of uveitis and a nonhemolytic Staphylococcus albus in a case of chorioretinitis.

3. Thirty-five specimens of anterior-chamber fluid from 33 patients, 27 with uveitis, were cultured on various media under aërobic and anaërobic conditions. The cultures yielded no growth.

4. The predominating organisms of the nasopharynx of patients with uveitis were similar to those isolated from patients with other ocular diseases.

5. No pleuropneumonialike organisms nor any other filtrable agents were isolated from the aqueous or filtered nasopharyngeal washings of the 16 patients with inflammatory eye diseases.

6. Of 56 patients with chronic inflammatory ocular disease who were tested for evidence of undulant fever, 3 gave a positive intracutaneous reaction and 1 an agglutinin titer of 1:40.

7. Extensive cultural studies have been made on 142 patients with various eye lesions, and during the course of this investigation 83 patients with rheumatoid arthritis and 22 with rheumatic fever were also studied. No microbial agent was consistently isolated, nor was any filtrable virus recovered from these patients.

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REGARDING THE EARLY DETECTION OF AVITAMINOSIS A BY GROSS OR BIOMICROSCOPIC EXAMINATION OF THE CONJUNCTIVA

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In a recent article entitled "The ocular manifestations of avitaminosis A, with especial consideration of the detection of early changes by biomicroscopy," by Kruse,[1] it is argued that biomicroscopic examination of the conjunctiva can be used as a means of detecting early avitaminosis A. If Kruse's observations and interpretations were correct they would assume great importance and would be far reaching in their consequences. Kruse suggests that: (1) Vitamin-A deficiencies can be detected by what he considers to be a relatively simple objective test; (2) 60 percent of the persons examined showed some evidence of this deficiency; (3) the symptoms may be readily relieved by giving vitamin A and measuring the results by his test.

Careful perusal of this paper prompted me to question the validity of many of the biomicroscopic interpretations. My contention is that, to a great degree, most of the gross and biomicroscopic findings outlined in Kruse's paper are attributable to well-known presenile and senile alterations of the conjunctiva. These conclusions are based not only on a five-year study of the biomicroscopy of the conjunctiva, but also upon a recent survey of 120 individuals of various ages. In this group there were 20 children, ranging in age from 3 months to 12 years. Fourteen of these were children, 4 to 12 years of age, seen in the pediatrics wards of New York Hospital, who were in a poor state of nutrition, yet they showed no demonstrable conjunctival changes.

Through the courtesy of Dr. J. M. Lewis, I examined six infants 3 to 4 months of age,* whose vitamin-A status was being studied by him and by Dr. Oscar Bodansky. These infants had been on a vitamin-A-free diet for eight weeks and their plasma vitamin-A concentration had been determined three days before my examination. These plasma vitamin-A concentrations were as follows: 16, 27, 30, 46, 51, and 57 International Units per 100 c.c., respectively. Three of these values were below the lower limit, 45 International Units per 100 c.c., of the plasma vitamin-A concentration in normal infants.[2, 2a] In one infant the concentration had a borderline value, 46 International Units. The remaining two values were somewhat higher, but still below the average value for normal infants. In none of these six infants was I able to detect any conjunctival changes.

In the older-age group (20 to 65 years), 40 patients were from my private practice (higher-income group) and 60 from the Ophthalmological Clinic of the New York Hospital. In this group of 100 cases, 30 patients ranged in age from 20 to 30 years (group A); 30 from 30 to 45 years (group B); 40 from 45 to 65 years (group C).

In order to establish criteria of the "normal" conjunctiva as seen biomicroscopically, drawings of the optic section of the conjunctiva were made in four 16-year-old individuals with "normal" conjunctivae. These drawings served as controls.

In group A, 12 of 30 persons between

* Those under three years of age were examined with a hand slitlamp and a loupe of ×10.

20 and 30 years of age showed some form of conjunctival change that might be considered as a variation from the "normal." In four persons there were localized raised areas (spots); in the other eight, variations were noted in the number and prominence of the superficial vessels, and alterations in transmissibility of the optic section obtained with the narrow slit (0.5 mm.).

Group B consisted of 30 persons between 30 and 45 years of age, 20 of whom showed definite alterations, especially marked in the interpalpebral zone, consisting of flat or raised "spots," larger elevations, cystic changes, variations in thickness, vasculature, and transmissibility of light.

Group C comprised 40 persons between 45 and 65 years of age, all of whom showed one or more of the aforementioned changes in the conjunctiva in varying degrees.

Further, in 15 cases, taken from the entire adult group of 100, blood analyses for vitamin A were performed. Of these, 10* were "spot" cases and 5 showed biomicroscopic variations classified as variations in thickness, vasculature, and transmissibility of light (table 1).

TABLE 1

VITAMIN-A DETERMINATIONS IN 15 PATIENTS HAVING "SPOTS" OR CONJUNCTIVAL VARIATIONS SEEN BIOMICROSCOPICALLY*

Date	Initials	Age	Sex	Condition of Conjunctiva†	Carotene mg./100 c.c. Plasma	Vitamin A‡	
						Micrograms per 100 c.c. of Plasma	International Units per 100 c.c. of Plasma
9/25/41	A.	51	F	S	0.19	47	138.6
	P.	55	F	V	0.20	58	171.1
	F.	49	F	S	0.54	53	156.3
9/29/41	P. G.	40	F	S	0.26	48	141.6
	C. P.	30	F	V	0.27	44	129.8
	C. R.	50	M	V	0.11	65	191.7
	E. S.	28	M	V	0.11	64	188.8
10/2/41	L.	32	F	S	0.28	72	212.4
	M.	61	F	S	0.30	78	230.1
10/3/41	P. M.	32	M	S	0.21	72	212.4
	E. M.	67	F	S	0.15	49	144.5
	S. H.	35	F	S	0.13	43	126.8
10/6/41	M. H.	22	F	V	0.24	48	141.6
	M.	26	F	S	0.13	55	162.2
	J. S.	24	M	S	0.10	75	221.2

* The blood tests were performed by Dr. W. R. C. Golden in the Vitamin Laboratory of the Departments of Pediatrics and Public Health, Cornell University Medical College, using the Kimble macro-procedure.

† S, spots; V, conjunctival variations seen biomicroscopically.

‡ The I.U. values were obtained by multiplying the values in micrograms per 100 c.c. by 2.95, a conversion factor which was obtained by comparing the calibration curve with that of Lewis, Bodansky, Falk, and McGuire.[3]

These data indicate that the lesions which Kruse considers to be due to vitamin-A deficiency are found in persons

* In spite of their present normal vitamin-A blood content, the patients with these spot cases are now being administered high doses of vitamin A and will be reported on at a later date.

with a normal vitamin-A content in the blood.

Kruse attempts to separate the conjunctival changes denoting avitaminosis A into three main classifications: (1) the presence of gross "spots," (2) changes seen only biomicroscopically, such as variations in visibility and configuration of the vasculature, thickness, and transmission of light, and (3) combinations of "spots" and changes seen biomicroscopically. According to the illustrations in the Milbank Memorial Fund Quarterly, the "spots," shown in kodachrome reproductions (diffuse illumination) and in a few cases demonstrated to me personally by Kruse are typical of pinguecula. These are flat or raised subepithelial infiltrations, usually occurring near the limbus, appearing as small white or yellow, irregularly oval or triangular nodes or patches, festooned by vessels, along the horizontal meridian in the exposed portion of the interpalpebral zone. A frequent site is at the level where the lower eyelid contacts the globe. They may be situated at the limbus or may be from 2 to 4 mm. distant to it. When small they are usually round. Histologic section of pingueculae reveals the following features: (1) a normal epithelium, (2) changes in the adenoidal layer consisting of granular hyaline material and fine yellow elastic fibers, (3) changes in the fibrous layer (deep) consisting of coarse yellow elastic fibers (fig. 1). The fact that the epithelium is intact in pingueculae should be emphasized because in prexerosis, xerosis, and in Bitot's spots a *true metaplasia* of the epithelium occurs. With the biomicroscope in direct focal illumination pingueculae are seen to vary in their appearance from a jellylike globule to a cloudy granular mass (fig. 1, A and B). Rarely, in the very old, other raised "spots," granular in composition, consisting of yellow concretions of lipoid or hyaline material and white chalky deposits resulting from degeneration of cellular products may be found. Fuchs states "in old people there is an area at the inner and outer margins of the cornea that by its yellow color is in contrast with this whiteness (normal scleral whiteness, M.L.B.). This has the shape of a triangle with its base at the corneal margin, and

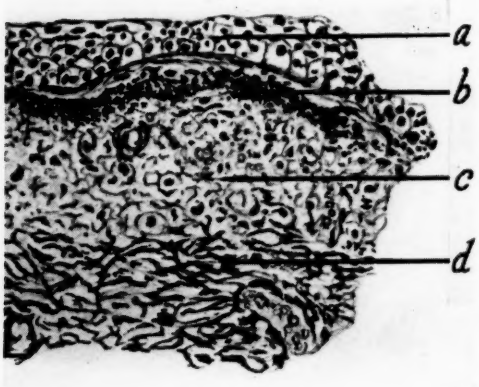

Fig. 1 (Berliner). Histologic section of pinguecula (after Collins): a, normal epithelium; b, granular hyaline material (adenoid layer); c, fine yellow elastic fibers (adenoid layer); d, coarse yellow elastic fibers.

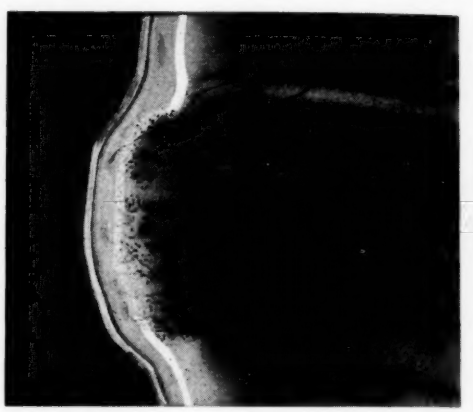

Fig. 1A (Berliner). Optic section through pinguecula showing subepithelial localization; the small dark granules are due to vitally stained elements by azure II.

projects a little above the rest of the conjunctiva. It is called the interpalpebral spot or pinguecula, and occurs because that part of the conjunctiva, being included in the interpalpebral fissure and thus constantly exposed to atmospheric conditions, has undergone alteration in its tissues."

Duke-Elder defines a pinguecula as "a yellowish triangular patch formed by hyaline degeneration and elastic tissue proliferation in the connective tissue, situated in the bulbar conjunctiva on either side of the cornea, being the combined expression of changes due to senility and exposure."

Under the heading "ocular signs of lesions in the gross 'spot' cases," Kruse states that of 166 persons examined, 65 (39 percent) had one or more manifest spots. The age range of his whole series was from 17 to 65 years. Since this age grouping is not broken down, it is impossible to determine how many of the 166 patients were, for example, over or under 40 years of age. The lesions which he described in these 65 patients, and which he illustrates in his photographs, are, I believe, characteristic of *pingueculae*, which, as noted above, are commonly encountered in the general population in individuals over 40 years of age. The evidence is inadequate to conclude that these "spots," described by Kruse and so universally present in individuals over 40 years old, are an indication of a state of prexerosis, or that they are an indication of avitaminosis A. It is unwarranted to assume that these spots are early forms of "Bitot's spots." In all my observations I have never seen such a spot develop into a true Bitot's spot, which occurs in xerosis and is found chiefly in children. Clinically, these conditions differ markedly: Bitot's spots are (1) more granular or solid, and (2) have a characteristic whitish-gray color (or pigmented in darker races), their surfaces being covered by a foamlike substance unwetted by tears. The foamlike substance can be scraped away but quickly re-forms. Scrapings of this secretion show masses of xerosis bacilli—epithelial debris, fatty material, and waxy substance (secretion from meibomian glands).

From the reports in the literature,

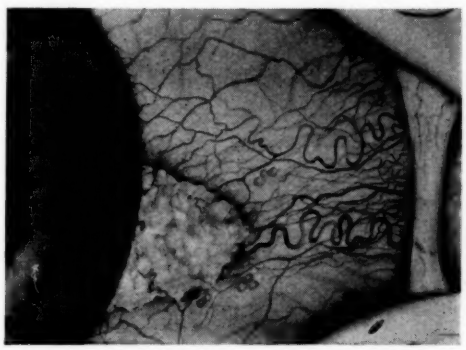

Fig. 1B (Berliner). Pinguecula at limbus by diffuse illumination (×30).

Bitot's spots may vary in appearance depending on race and climate, but in all instances they differ from pingueculae, and I do not believe that an ophthalmologist would confuse the two. Moreover, it is by no means universally accepted that even true Bitot's spots or xerosis of the conjunctiva without Bitot's spots is always due to avitaminosis A. Such workers as Palmer in Assam (1936), Métivier in Trinidad (1941), and Sie-Boen-Lian in Java (1938) found no improvement in their cases of Bitot's spots following the administration of vitamin A. In his paper "Bitot's spots in Trinidad"[4] Métivier states "Sie-Boen-Lian (1938) observed 19 cases of Bitot's spots in Java in which deficiency of vitamin A was clinically and biologically excluded; and he came to the conclusion that Bitot's spots are by no means a positive sign of deficiency of vitamin A. He says that the majority of his patients

affirmed that they had the spots in early childhood and even believed that they were present from birth. Similar statements have been made to me by Trinidad parents and young adults. This difficulty or impossibility of curing Bitot's spots with vitamin-A preparations in certain groups of patients is fairly well recognized among persons with pigmented skins, for Palmer, Sie-Boen-Lian, Aykroyd, and Rowland Wilson (personal communication, 1938) Nicolls, and I have had experiences, more or less the same, in Assam, Java, South India, Egypt, Ceylon, and Trinidad. The records of observers in different parts of the world have been collected and brought into relationship with experience gained in Trinidad in order to bring out the full meaning of Bitot's spots and other related conjunctival appearances."

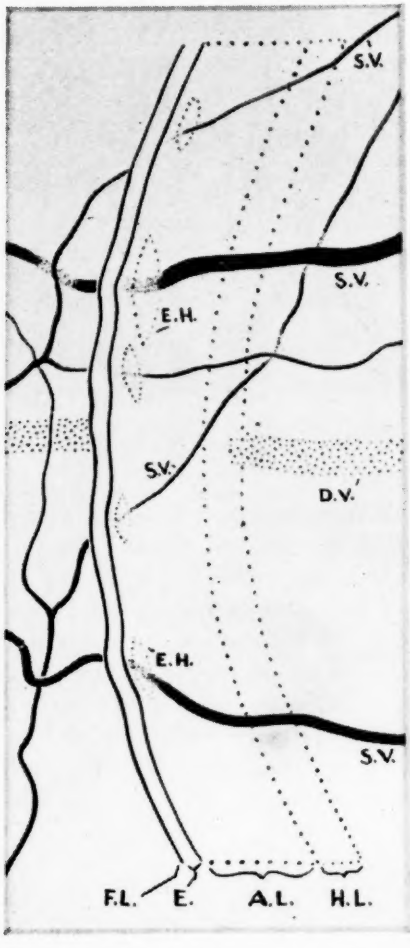

Fig. 2 (Berliner). Diagram of optic section showing layers of bulbar conjunctiva. F. L., film line; E, epithelial thickness; A. L., adenoid layer; H. L., hyaloid or fibrous layer; S. V., superficial vessels; E. H., elliptical halo about vessels; D. V., deep vessels.

I also take issue with Kruse in regard to the second classification; namely, changes seen biomicroscopically in degrees of conjunctival thickness and transmission of light as an indication of prexerosis or avitaminosis A. There is no doubt that such changes do occur in established prexerosis of the conjunctiva (due to avitaminosis A or to other reasons). Métivier says that "the term prexerosis conjunctivae is suggested for those changes when Bitot's spots are not made out, even with the aid of a corneal magnifier." These changes are dryness, wrinkling, loss of luster, and epithelial pigmentation (Pillat); the latter must be distinguished from the normal limbal subepithelial pigmentation commonly found in the aged and in the dark races. When present, these signs are definite, and until such time as more evidence is obtained, minor subepithelial variations, so uniformly found throughout the population, should not be stigmatized as indications of avitaminosis A.

With the use of the narrow beam of the slitlamp or biomicroscope, it is possible to obtain an optic section of the conjunctiva. Similar to the cornea, the optic section (figs. 2 and 3A) reveals first the film line (best delineated by the use of a stain, like fluorescein). This line, which is always present even in true xerotic states, is due to a thin film of fluid that is ever present over the surface of the conjunctiva. Beneath it is a narrow

dark space representing the epithelial thickness. The epithelium, being nondispersive and nonrelucent (as in the cornea) permits the maximum transmission of light and appears relatively dark. The subepithelial layer (adenoid) is indicated by a diffuse grayish-white area, delicately stippled, resembling a colloidal suspension. The composition of this layer varies from case to case, even in the same age group, probably just as the texture of skin varies from one person to another. In adults, at times, this layer becomes more densely granular, due to the presence of whitish linear shining particles of various sizes. This appearance may be due to increased internal specularity. In the aged, the deeper part of this layer (adenoid) becomes compressed, narrow, and more relucent (fig. 3B). It is true that the degree of opalescence of the adenoid layer governs in part the degree of conjunctival transparency, but unless some form of colloidimetry—for example, employment of standards—is utilized, it would be impossible to make any worthwhile deductions concerning the relative degree of opalescence. Likewise, in attempting to draw conclusions regarding the vasculature, one would have to consider the frequency of mild conjunctival irritations resulting from eyestrain, associated with errors of refraction or from exposure to common physical agents, such as sun, wind, dust, smoke, and the like. With age, the superficial conjunctival vessels become more prominent, and because of the thinness and increased relucency of the deeper part of the adenoid layer the deeper episcleral vessels may become less apparent.

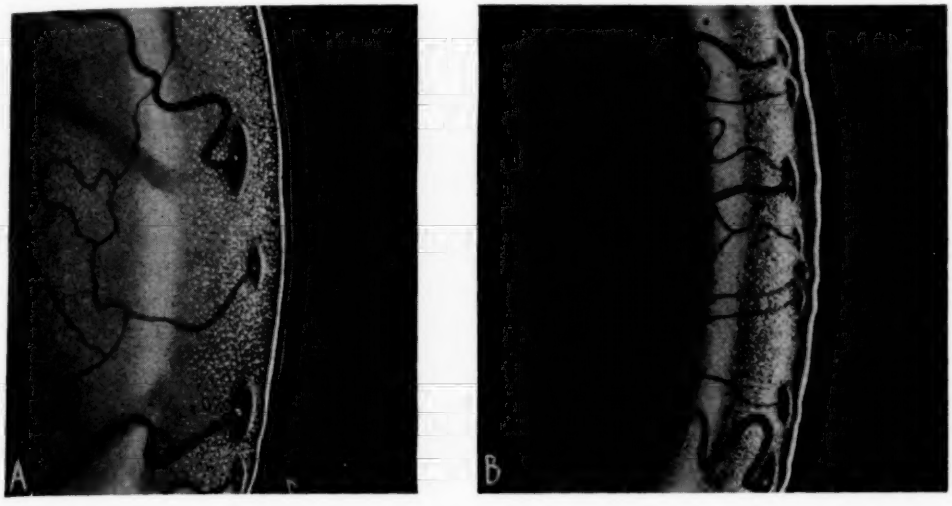

Fig. 3 (Berliner). A, optic section through normal bulbar conjunctiva of a young person (16 years of age). B, optic section through the normal bulbar conjunctiva at 50 years of age.

The deepest layer is the fibrous layer, which appears yellow in color and is seen to be blurred in the deepest part of the section. Anatomists consider this layer to belong to the episclera rather than to the conjunctiva proper. In adult life the subepithelial adenoidal layer becomes more compressed and its surface irregular, so that the dark epithelial stripe widens (thickening?). But again without micrometric methods and study of thousands of cases (which, as yet, has not been attempted), it is questionable how

any rough estimations concerning delicate variations in thickness of the conjunctival layers as seen with the biomicroscope may be used as criteria of vitamin-A deficiency.

The visibility of details in optic sections varies depending on the narrowness of the beam, the intensity of the light source, and the magnification used. Under higher illumination (from overloaded nitra bulb—12 volts or an arc) certain areas which seem clearer or less relucent become more opaque. Also when using the higher magnifying powers, ×35 or more, the annoying physiologic oscillations of the eyeball become disturbing and it is no easy matter to make observations.

In his summary, Kruse states "in all cases the striking feature is the very long period of time required for complete recovery, a matter of months even with therapy of high potency." This finding differs markedly from results obtained from vitamin-A administration by other workers. According to Lewis and Haig,[5] the administration of vitamin A in large doses to those having faulty dark adaptation, night blindness, or xerophthalmia results in very rapid improvement. In experimental animals, Bessey and Wolbach[6] found that "repair after restoration of vitamin A to the diet is rapid. In rats there is a lag of a few days, within six to eight days, gain in weight, resumption of growth in bones and teeth, regeneration of bone marrow and spleen are apparent. Reparative changes in the metaplastic epithelium begins as early as the fifth day."

In conclusion, I do not consider (1) that the observations made by Kruse on the conjunctiva represent prexerotic states or states possibly indicating an avitaminosis A, but that they represent common presenile and senile alterations; (2) that the "spots," or pingueculae, are subepithelial infiltrations, the epithelium over them being unaffected, a condition different from xerosis in which the changes are in the epithelium, and that such spots are not associated with low states of vitamin A, as proved by blood tests; (3) that until such time when more accurate methods of colloidimetry and micrometry are employed and standards created, no accurate deductions can be made concerning the myriad variations in thickness and relucency of the normal conjunctiva; (4) and finally that it is not even certain that all cases of prexerosis, xerosis, and Bitot's spots—that is, those not preceded by preëxisting con junctival disease, such as, for example, trachoma or pemphigus—are due to vitamin-A deficiency.

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THE USE OF DORYL IN THE TREATMENT OF GLAUCOMA*

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It is the purpose of this paper to review the results of a clinical testing of the drug doryl (Merck) in the treatment of glaucoma. Included in this discussion are: a brief review of the literature, a short summary of the pharmacology involved, and an attempt to evaluate the effectiveness of doryl as compared with some other commonly used miotics.

Doryl (carbaminoylcholine chloride) was first introduced by Kreitmair in 1932 as a stable parasympathomimetic agent many times as active as acetylcholine and effective both by oral and parenteral administration.[1] His observations were quickly confirmed and extended by Nöll, who found carbaminoylcholine chloride to have a powerful action in lowering blood pressure, stimulating salivation, increasing gastric secretion, and stimulating peristalsis.[2] Velten[3] reported that it stimulated uterine musculature and that large doses caused hyperglycemia in cats. It was his observation that no habituation nor cumulative effects resulted from prolonged administration of the drug. The mechanism of the fall in blood pressure after doryl administration was found by Raab *et al.*[4] and by Dautrebande *et al.*[5] to be a peripheral vasodilation. In 1932 Feldberg noted that if doryl were injected into the coeliac artery of a cat it caused a marked secretion of adrenalin. This action was blocked if the cat had previously been given large doses of nicotine.[6] The toxicology and pharmacology of doryl were studied by Velhagen in 1933 in a series of animal experiments. He found that doryl contracted the sphincter of the pupil even when given in great dilutions, that it reduced intraocular pressure, and that it lowered blood pressure. He reported that these actions were antagonized by atropine.[7] In a thorough-going study of the effects of doryl on man, Starr showed that in doses of 0.1 mg. to 1.0 mg. injected subcutaneously or 0.4 mg. to 1.0 mg. when taken orally, doryl caused flushing of the face, perspiration, salivation, increased peristalsis, increased pulse rate, decreased blood pressure, and increased *basal metabolic rate*. The respiratory rate was unchanged: the respiratory volume increased. Blood-sugar levels and blood-urea nitrogen were not changed by this dosage. Starr found that atropine antagonized the "muscarine" (parasympathetic) effects of doryl, but not the "nicotine" effects.[8]

The use of doryl in ophthalmology was initiated soon after the discovery of its properties of causing miosis and reducing intraocular pressure. Velhagen reported in 1933 that 0.75-percent doryl gave as good miosis as 2-percent pilocarpine.[9] Continuing his studies, he published in 1934 his observations that doryl (0.75 percent) gave better miosis than 2-percent pilocarpine when instilled into the conjunctival sac, but that it gave slightly less miosis than 0.25-percent eserine. He believed that some additional mechanism besides the miosis was involved in the lowering of the ocular tension which he observed. He found only two slight toxic symptoms from the use of 0.75-percent doryl: Occasionally there developed a passing hyperemia of the conjunctiva—lasting perhaps 20 minutes—and one of his female patients

* From the Massachusetts Eye and Ear Infirmary and the Carney Hospital. Work aided by a grant from the John and Mary Markle Foundation, New York. Read before the New England Ophthalmological Society, February 17, 1942.

suffered a transient headache after administration of doryl drops. He found doryl an effective agent for lowering intraocular pressure and suggested its use to augment the range of miotics in the conservative treatment of glaucoma.[10] This work was confirmed and extended by Appelmans,[11] Galeazzi,[12] Fontana,[13] and Wilenkin.[14] Certain of these men (Galeazzi and Fontana) felt that doryl reduced tension best in the chronic simple type of glaucoma, but their cases were incompletely followed and for only a few hours. Therefore, the value of their observations is questionable, to say the least. In 1937 de Sanctis reported six cases of different types of glaucoma in which doryl therapy was given. Only in the cases of chronic simple glaucoma (three out of the six) was the tension reduced by doryl. He studied the duration of active miosis and reduced tension after a single application of doryl, and found that the miosis lasts two to five hours, while reduced tension is prolonged from 24 to 28 hours after a single administration of 0.75-percent doryl dropped into the conjunctival sac. He attributed the effectiveness of doryl in reducing tension to two factors; namely, dilation of intraocular blood vessels, bringing about an increased outflow of intraocular fluid, and an inhibition of the secretory activity of the ciliary body.[15] It should be called to the attention here that all of the aforementioned studies have been aimed at the determination of what happens to the ocular tension during the first 24 to 48 hours after treatment with doryl. None of these studies gave an account of results of prolonged treatment of glaucoma with doryl.

In summary, the physical and pharmacologic properties of doryl are as follows: It is a crystalline, soluble, thermostable, parasympathomimetic agent. In large doses it causes flushing of the face, vascular dilation, decreased blood pressure, increased pulse rate, increased basal metabolic rate, increased respiratory volume, sweating, salivation, peristalsis, and secretion of adrenalin. When administered as drops into the conjunctival sac, doryl in 0.75-percent solution brings about the localized ocular effects of miosis and decreased intraocular tension. Doryl has both "muscarine" and "nicotine" actions, only the former being abolished by atropinization.

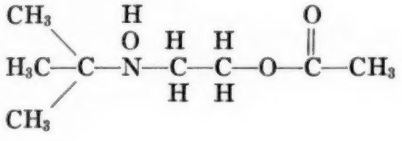
Before taking up a discussion of the cases, a brief consideration of the pharmacology of drugs commonly used in the treatment of glaucoma is in order. This has already been discussed in more detail in a previous paper[16] and will be only summarized here.

The possible mechanisms by which miotics help to reduce ocular tension seem to be by (a) opening the angle of the anterior chamber to provide free egress of the aqueous humor through Schlemm's canal, (b) influencing capillary filtration and reabsorption of aqueous by an effect on the blood-vessel walls, and (c) a specific influence upon the rate of secretion or absorption of the aqueous humor by the cells of the iris stroma and ciliary body. Particularly in the case of pilocarpine, the action is that of a parasympathomimetic agent that stimulates directly muscle fibers innervated by the parasympathetic nervous system. It causes contraction of the sphincter of the pupil (miosis) and of the circular muscle fibers of the ciliary body (accommodation). It also causes vasodilation by direct action on certain smooth-muscle fibers in blood-vessel walls. Its action on formation and absorption of aqueous is not definitely established, but it does lower ocular tension.

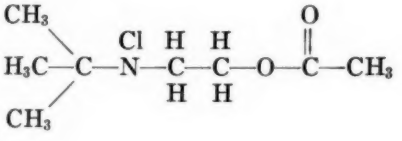
Eserine is also a miotic, but has a different action from that of pilocarpine. Its chief action is to block the destruc-

tion by cholinesterase of acetylcholine liberated at parasympathetic nerve endings. Acetylcholine is thereby allowed to accumulate in greater concentration and to stimulate contraction of the smooth muscles that normally receive parasympathetic innervation and to continue whatever effect it may have on the aqueous production and absorption apparatus. Administration of eserine, therefore, causes constriction of the pupil, accommodation, and vasodilation as in the case of pilocarpine, but by a different mechanism.

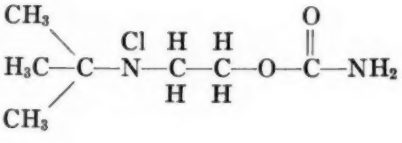
Three other miotics may be discussed that are very closely related to each other. These are acetylcholine, mecholyl (acetyl-beta-methylcholine), and doryl (carbaminoylcholine chloride). Their close relationship is shown by their structural formulas which are as follows:



Acetylcholine



Acetyl-beta-methylcholine



Carbaminoylcholine chloride

The mechanism of action of all three of these drugs is similar; namely, direct stimulation of smooth muscles receiving parasympathetic innervation and vasodilation. Acetylcholine is destroyed very quickly by the cholinesterase present in all tissues. Mecholyl and doryl are much more stable and consequently are powerful stimulants even in very great dilutions. Mecholyl is destroyed by acetylcholine-esterase in 15 to 45 minutes, while doryl is apparently not affected at all by the cholinesterase.

As was expressed in a preceding paper,[16] it is logical to assume that drugs which paralyze the action of the sympathetic nervous system upon the eye, or drugs which mimic parasympathetic effects upon the eye are possible agents for use in the treatment of glaucoma. Mecholyl has already been studied as such an antiglaucomatous agent;[16] but, since its action is rather evanescent, the present study was undertaken to determine, if possible, whether the new drug, doryl, might not be more effective in decreasing ocular tension over longer periods of time, because its freedom from destruction by cholinesterase gives it a prolonged effect comparable theoretically to the joint use of mecholyl and prostigmine or mecholyl and eserine. The attempt has been made to compare the effect of doryl therapy with some of the other drug therapies commonly employed in glaucoma.

At the outset it was felt that certain rigid criteria should be established for the purpose of evaluating the data obtained. This study was made chiefly upon patients of the Clinic at the Massachu-

setts Eye and Ear Infirmary. Those chosen for this study were all patients in whose cases the usual miotic drugs had been tried and were obviously failing to keep the glaucoma under control and for whom surgery was indicated within the near future under their present regime. No cases of acute, congestive glaucoma are included because in a few cases it had been found that even 1.5 percent doryl was so ineffective, when compared with the results obtained by use of combined mecholyl and prostigmine, that the use of doryl in acute glaucoma was promptly abandoned. Therefore, it is safe to say that all the patients in this series were already upon a downhill course of chronic glaucoma; and if doryl were successful in keeping them from becoming worse, it should really be considered more effective than the previously used miotic. Some of these patients had been operated upon one or more times and some were aphakic, but all were running tensions varying from 25 to 40 mm. Hg (new Schiötz) under a miotic therapy of one type or another. In other words, they all manifested uncompensated cases of chronic glaucoma, none were cases of acute or subacute congestive glaucoma.

Out of the entire group which received doryl therapy, only those were chosen for this study who had received doryl therapy continuously for at least two months, or (in a few cases) those who had received doryl continuously for six weeks with at least three readings of ocular tension during the six weeks' period. Therefore, this paper discusses the results of doryl therapy in less than half the total number of patients on whom doryl has been tried during the past two years.

In comparing the efficiency of doryl treatment with other forms of therapy, the same criteria have been applied. That is, no other therapy has been compared with the doryl treatment unless it, too, had been used continuously for at least two months (or six weeks with three readings). If the average tension (new Schiötz) under doryl did not deviate more than plus or minus 5 mm. Hg from the average value obtained by the use of another therapeutic agent, then doryl is here rated as having been equally effective. If the average tension under doryl was found to be 5 mm. Hg (or more) less than that under another drug, doryl is considered to have proved more effective than the other drug. On the other hand, in those cases in which doryl was used and the average tension was 5 mm. Hg (or more) greater than the average tension when another therapy was employed, doryl was accounted inferior to the other miotic.

It was observed in many cases that when a patient who had been given the same therapy (not doryl) for a long period of time was put on doryl for several weeks and later was returned to his former treatment, this treatment was afterward much more effective than it had been just before doryl was tried. It is postulated that the patient might gradually have built up some tolerance to the drug in question, which tolerance disappeared during the time that doryl was substituted. It seems fitting to give the designation "rest therapy" to this use of doryl in reducing tolerance to other antiglaucomatous drugs. Since this phenomenon occurred in a number of cases, it was considered profitable to study statistically the effectiveness of doryl as a "rest therapy" in this group of cases. For this purpose only cases are included in which some other drug had been used continuously for long periods (two months or more) before doryl was given. Doryl was then used for two months or more, and then the patient was put back on his previous medication. If this original medi-

cation now caused a tension (new Schiötz) of 5 mm. Hg or more lower than the patient had before he was put on doryl, doryl was considered to have been valuable as a "rest therapy."

Another noteworthy result of doryl treatment was also observed. Many patients develop irritation and sensitivity when other miotics are used. Practically all cases of dermatitis, allergic reactions, conjunctivitis, and the like, cleared up when the patient was shifted to doryl. A short summary of results obtained relating to this problem will also be included.

An attempt was made to guard against the patient's using doryl more frequently than he had used his previous miotic. When, for instance, a patient who had been using 2-percent pilocarpine thrice daily was chosen for this series he was always told to use the doryl the same number of times per day that he had used the pilocarpine. One of the most important factors in doryl therapy is the instruction to be given the patient as to its use. Molitor found that in cats very little miosis was produced by instillation of doryl solution; but if light massage were applied after instillation of the drug an intense miosis resulted.[17] With this in mind, several patients who were getting rather poor results with doryl were told to rub vigorously and massage their eyes for two minutes after instilling their doryl. The results were rather dramatic; therefore all patients were strongly advised to use this massage. It is felt that without massage very little doryl is absorbed and its effectiveness is greatly reduced. Too much emphasis cannot be placed on this most important point.

Case reports

Case 1. G. R., a 33-year-old white male with aniridia, nystagmus, and dislocated lenses (which had been removed eight years before in both eyes) had run an intraocular pressure varying from 30 to 90 mm. Hg (new Schiötz) for eight years. Vision was 20/200 in both eyes. Pilocarpine (2-percent and 4-percent), eserine, mecholyl and prostigmine, and adrenalin borate had all been used without success. On September 21, 1939, this patient was given 0.75-percent doryl drops. The tension fell at once and remained at a level of 10 to 24 mm. Hg (new Schiötz) in both eyes until June 6, 1941, date of the last reading. Doryl had been used throughout that period of 20 months.

This is obviously a case in which, for some unknown reason, doryl must have affected either the formation or absorption of aqueous in some way different from the action of the aforementioned drugs.

Case 2. A 52-year-old white female with chronic, simple, barely compensated glaucoma, full fields and normal vision had been running a tension of 25 mm. Hg (new Schiötz) over a two-year period and for the past three months had developed a typical low-grade allergic conjunctivitis and dermatitis to 2-percent pilocarpine given thrice daily. The patient was shifted to 0.75-percent doryl, thrice daily, plus massage and has run a tension of 18 to 20 mm. Hg (new Schiötz) for two years. Her dermatitis and conjunctivitis completely disappeared within a month and have not recurred.

Discussion of data

It was difficult to evaluate the results of the uses of doryl in some of these cases. Most of the patients had not done well under other treatment than doryl and had been developing progressively higher intraocular pressures previous to the institution of doryl therapy. In many instances in which doryl held the tension

TABLE 1

THERAPY COMPARED WITH DORYL

Patient No.	2% Pilocarpine			4% Pilocarpine			2% Pilocarpine & 0.5% Eserine		
	Doryl Better	Doryl Equal	Doryl Poorer	Doryl Better	Doryl Equal	Doryl Poorer	Doryl Better	Doryl Equal	Doryl Poorer
1	1								
2		1			1				
3		1			1				
4		1			1			1	
5		1						1	
6	1								
7		1							
8		1						1	
9		1							
10		1							
11		1							
12		1							
13		1			1			1	
14	1				1			1	
15		1							
16		1				1			
17						1			
18					1				
19		1			1				
20		1							
21		1			1				
22	1				1				
23	1								
24	1								
25	1				1				
26	1				1				
27	1			1					
28				1					
29		1							
30		1			1				
31	1				1				
32	1								
33		1							
34	1								
35	1			1					
36		1					1		
37			1						
38		1							
39			1						
40		1							
41					1			1	
42								1	
43								1	
44								1	
45	1						1		
46		1							
47	1								
48	1							1	
49									
50	1				1				
					1				
Total	17	24	2	3	16	2	2	10	0

TABLE 2

"REST THERAPY"

Patients in whom doryl was valuable as "rest therapy"	8
Patients in whom doryl was not valuable as "rest therapy"	8
Total number of patients in whom conditions set for testing "rest therapy" were fulfilled	16

TABLE 3

DERMATITIS AND SENSITIVITY

Patients in this group showing dermatitis, conjunctivitis, allergic reactions, and the like.....	12
Patients of this group cured of dermatitis, conjunctivitis, and the like, by doryl administration	12

NOTE: In all 12 of the cases listed in the table above, the patients complained of irritation and redness of the eyes with varying degrees of dermatitis and allergic conjunctivitis from a sensitivity to the drug used before doryl. In all of these cases these symptoms were relieved by the substitution of doryl for the previously used miotic.

to the same level as had the preceding therapy it had at least arrested an upward trend of the patient's ocular tension. Such an action has here been rated of equal value to that of the drug used before doryl, but it may be questioned whether doryl was actually not of more value than the other therapy.

It may be said in summary of the effectiveness of doryl in controlling ocular tension in glaucoma (table 1) that doryl is better than 2-percent pilocarpine, about equal to 4-percent pilocarpine, and about equal to a mixture of 2-percent pilocarpine and 0.5-percent eserine.

ADVANTAGES AND DISADVANTAGES IN THE USE OF DORYL

Advantages: 1. Its action in reducing glaumatous tension is stronger than that of 2-percent pilocarpine. 2. It is valuable as a "rest therapy," after which the patient may be more responsive to the use of the usual miotics. 3. Doryl is nonirritating. 4. It relieves allergic dermatitis and conjunctivitis in patients who are sensitive to pilocarpine or eserine. 5. Doryl has a specific effect in some rare cases in which (for reasons unknown) it controls ocular tension which had not been amenable to obviously stronger miotics,

Disadvantages: 1. Doryl is more expensive than pilocarpine or eserine; but it is less expensive than the combination of mecholyl and prostigmine. 2. Occasionally patients using doryl experience general discomfort. This is rare, and no severe reactions have been encountered. 3. There may be transient refractive changes when doryl is first used—usually in a myopic direction. This usually wears off in a few weeks.

SUMMARY AND CONCLUSIONS

1. Doryl is a parasympathomimetic agent capable of lowering the ocular tension in glaucoma.

2. Doryl may be given in 0.75-percent concentration, which is much less irritating than other commonly used drops in the treatment of glaucoma.

3. Doryl varies in effectiveness. Some patients maintain much lower tensions under doryl than under other drugs. Many patients are better controlled by doryl than by 2-percent pilocarpine. In a few patients doryl is not so effective as 2-percent pilocarpine. The action of doryl is usually about as strong as that of a mixture of 2-percent pilocarpine and 0.5-percent eserine.

4. One of the most important considerations to be borne in mind when using doryl drops is that slight massage greatly increases the absorption and effectiveness of the drug.

5. Doryl is valuable as a "rest therapy." Its use for a time seems to reduce a patient's tolerance to other miotic drugs so that they are more effective again after the period of doryl administration.

6. Doryl is an effective substitute for other miotics which have caused a development of sensitivity in the patient accompanied by dermatitis and conjunctivitis. The use of doryl in such cases

cures these annoying symptoms.

7. Doryl is not presented as a substitute for all other pharmacologic agents used in the treatment of glaucoma. It does possess properties (non-irritating, effective lowering of tension in many patients) which make it a valuable drug to augment the armamentarium of conservative treatment of glaucoma.

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STUDIES ON THE INFECTIVITY OF TRACHOMA*

XI. The effect of sulfanilamide on the virus

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Therapeutic studies undertaken in the past both on the Navajo Reservation[1] and in the Trachoma Hospital at Rolla, Missouri,[2] to determine the effectiveness of sulfanilamide on trachoma proved to be more or less equivocal. The clinical observations revealed that in our hands the drug caused an initial improvement in most early cases, but that actual healing or regression of the different manifestations was the exception rather than the rule. While certain varieties or stages of the disease responded more favorably to the treatment than others, this conclusion, nevertheless, appeared to be justifiable. Deliberation upon the results since their publication suggested further study towards an explanation of the discrepancy of different observers on the value of sulfonamides in trachoma. It is curious that with the numerous reports now accessible on sulfonamide therapy so fundamental an experiment as the *in vitro* effect of the drugs on the virus of trachoma has escaped the attention of the workers in this field. Consequently, it was decided to obtain information on this question, and the present paper comprises a report of the observations made.

Materials and methods

Virus of trachoma. Virus was obtained in the form of conjunctival scrapings suspended in veal infusion broth during the operation for grattage. All of the patients contributing tissues had clinically active cases of the disease, for the most part to be classified as Types I and II. They had all come to the Trachoma Hospital in Rolla for care and treatment. Tissues from several patients were pooled each time in order to have a sufficient supply for the experiments to be done.

Preparation of virus material. The suspended tissues from several patients were first pooled and after thorough mixing they were divided equally in four portions. To three portions, an equal volume of sulfanilamide dissolved in physiological saline was added, so that the final concentrations of the drug equalled 1:300, 1:3,000, and 1:30,000. Since the limit of solubility of sulfanilamide is about 1:150, it will be realized that 1:300 is as high a concentration as can feasibly be used. The fourth portion was diluted equally with physiologic saline alone, and thus served as a control. The different preparations were agitated from time to time, and exposure to the drug was conducted at room temperature for an interval of four-and-one-half to five hours. The different mixtures were then inoculated into monkeys (*M. rhesus*) by subconjunctival injection in one eye and by swabbing of the other, as described in previous communications.[3]

Experimental

According to the manner described, five complete experiments were performed. In

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TABLE 1

OUTLINE OF INDIVIDUAL EXPERIMENTS ON THE EFFECT OF SULFANILAMIDE ON THE VIRUS OF TRACHOMA

Concentration of Sulfanilamide	Experiment Number														
	I			II			III			IV			V		
	Number of Monkeys			Number of Monkeys			Number of Monkeys			Number of Monkeys			Number of Monkeys		
	Tested	Infected	Died	Tested	Infected	Died	Tested	Infected	Died	Tested	Infected	Died	Tested	Infected	Died
1:300	3	0	1	3	1	1	3	0	1	4	0	0	4	3	0
1:3,000	3	1	0	2	2	0	3	1	0	3	0	0	3	1	0
1:30,000	3	1	1	2	0	1	3	2	0	3	0	0	3	1	0
Control	3	1	1	2	1	1	3	1	0	3	0	0	3	1	0

Animals classified as died, succumbed to extraneous causes before the end of incubation period.
Experiment IV was a failure due to prolonged interval between collection and inoculation.

order to present the results as simply as possible, the data are summarized in table 1 in the form of an outline of each experiment. Analysis of the data reveals that in the first experiment 12 monkeys were inoculated, three each with grattaged material suspended in saline, or mixed with sulfanilamide diluted 1:300, 1:3,000, or 1:30,000. Infections were induced in one monkey of the three groups receiving either material alone, or that mixed with sulfanilamide in dilutions of 1:3,000 and 1:30,000. In the second experiment, conducted as a repetition of the first, specific infections were observed in one of two animals inoculated with untreated grattaged tissues; inoculations of the treated tissues were followed by experimental trachoma in one of three monkeys when the concentration of the drug was 1:300, two of two monkeys when the concentration was 1:3,000, and neither of two monkeys gave any response when the sulfanilamide was present in proportions of 1:30,000. Repeating the experiment a third time yielded the following results: Control material led to infection in one of three animals; mixed with sulfanilamide, 1:300, none of three animals was affected; with sulfanilamide, 1:3,000, one of three animals was infected; and in the last concentration of 1:30,000, two of three animals later presented experimental trachoma.

The fourth experiment proved to be a complete failure. A desire to increase the period of exposure of the virus to the drug led to conducting the tests after a much longer interval between mixing the reagent and inoculation. Unfortunately, the period was prolonged to such an extent that the original material itself was inactivated, and, therefore, the experiment is of little significance from the viewpoint of sulfanilamide. It illustrates, however, the difficulties under which study of the virus of trachoma must be managed. As was pointed out in an earlier paper,[4] the virus is of such a fragile nature as to prevent the performance of experiments requiring an extended degree of manipulation. Consequently, it has been impossible to acquire on the trachomatous virus information similar to that available on a number of other viruses.

In the fifth and final experiment, the period of exposure, therefore, was necessarily reduced to that of the former tests, namely, four-and-one-half to five hours. The results observed on this occasion indicate that the control scrapings induced typical disease in one of three animals. When the same material was mixed with sulfanilamide, the resultant specific infections with the different dilutions were as follows: 1:300, three of four animals; 1:3,000, one of three monkeys; and 1:30,000, also one of three animals.

The results of the above experiments suggest that under the conditions described, sulfanilamide has little effect on the virus of trachoma when the tests are performed *in vitro*. A casual glance at the data submitted may convey the false impression that in the strongest concentration (1:300) of the drug the virus may have been less infective. The data were, therefore, restudied with the disclosure of an interesting factor. Thus, in the first 3 experiments (see table 1) there was an unfortunately high mortality among the inoculated monkeys due to intercurrent disease (7 of 33 animals, or about 21 percent). These animals died during the incubation period so that they were in actuality unfair trials; and, curiously enough, the fatality rate was greatest in the monkeys receiving tissues with the highest concentration of drug (three of nine animals, about 33 percent). It is not intended to imply, however, that sulfanilamide was in any way contributory to the deaths. Consequently, if the rate of infectivity between the different groups is to be compared fairly, it becomes necessary to rearrange the data so as to exclude animals that died before trachoma had sufficient time to develop; and also to eliminate entirely experiment 4, since the control tissues were noninfective. Reassembling the data on this basis, then, a proper analysis may be made. Table 2 gives the summarized rearrangement.

TABLE 2

SUMMARY OF REVISED DATA EXTRACTED FROM TABLE 1

Concentration of Sulfanilamide	Number of			Percentage Infected
	Experiments	Monkeys		
		Tested	Infected	
1:300	4	10	4	40
1:3,000	4	11	5	45
1:30,000	4	9	3	33
Control	4	9	4	44

It will now be seen that four satisfactory experiments were concluded with each dilution of sulfanilamide. The tissues serving for purposes of control were tested for infectivity in nine animals with four, or 44 percent, becoming specifically infected. Inoculations of tissues exposed to a concentration of sulfanilamide of 1:300 were followed by experimental trachoma in 4 of 10 monkeys for a percentage of 40. Decreasing the concentration of drug to 1:3,000 the infective rate appeared to be 5 out of 11, or 45 percent. When the scrapings were subjected to the action of the drug diluted 1:30,000, typical infections appeared in three of nine monkeys inoculated, or about 33 percent. The composite results of this study reveal, therefore, that the number of animals infected ran close to the anticipated average,[5] and that there was a slight fluctuation (15 percent, maximum) in the incidence of trachoma following inoculation with the differently treated tissues. If the variation of individual monkeys to trachomatous infection is considered,[5] then it becomes readily apparent that the deviations in infective rate are referable to the animals inoculated rather than to possible alterations in the tissues studied. The conclusion seems eminently fair, therefore, that trachomatous tissues retain their original infective capacity after contact with sulfanilamide.

Discussion

The experiments reported in the present communication were undertaken with the purpose of visualizing the effect of sulfanilamide on the virus of trachoma. It is obviously impossible to study the question as thoroughly as has been done notably with bacteria, since the virus does not lend itself to desirable variations in experimental conditions. Consequently, the study was conducted of necessity in the limited manner described. This, however, should not impose a disparagement

on the integrity or significance of the observations reported, since similar methods have been employed formerly, both in this laboratory and elsewhere, to establish characteristics of the virus now generally accepted as facts. Therefore, it may be said with justification that sulfanilamide, in concentrations of 1:30,000 to 1:300 and in periods of contact up to five hours, does not alter the original infective capacity of the virus of trachoma. In the light of earlier experiments which illustrate the delicate nature of the virus and its rapid inactivation by various physical and chemical agents[4, 5] this observation came somewhat as a surprise. In fact, it is the only otherwise deleterious agent tested in this laboratory with impunity to the trachomatous virus.

It may be interesting to translate the concentrations of sulfanilamide employed in this study into terms of commonly prescribed therapeutic dosage. Analyses made in this laboratory together with those reported in the literature show variations in the blood concentration of patients under treatment varying from 2.5 to 5 mg. per 100 c.c. of blood, with 3.0 mg. a generous, general average. On the basis of 3.0 mg. per 100 c.c. of blood, or about 1:33,000 if expressed in the form of dilution, the highest concentration used in this study is about 110 times greater than that observed in treatment; or if 5 mg. per 100 c.c. of blood is preferred for comparison, 66 times greater.

The potential importance of the observations reported resolves itself into a question of its clinical significance. The writers are well aware that in their bacterial activity, at least, the sulfonamides are more bacteriostatic than bactericidal, and in retarding or preventing growth they aid indirectly in regression of the infection. This means of analysis, however, is not applicable in the case of trachoma, since no method of artificial propagation is yet available. On the other hand, its rate of growth, as measured in the animal, is already so slow that it is doubtful whether such a method would be of great assistance.

If the commonly accepted concept of the infectivity of viruses is correct, disease occurs only when the virus in question penetrates into and multiplies within the susceptible tissue cell. Consequently, for a chemical agent to be effective therapeutically, the agent must either diffuse into the infected cell and selectively destroy the virus, or by some indirect action it must stimulate the cell to inactivate the virus. The experiments detailed above indicate clearly that sulfanilamide does not directly render the virus of trachoma noninfective. That the drug may not even act indirectly on the cell is also suggested from the preceding observations. The conjunctival cells containing the virus remain alive during the period of exposure with ample opportunity to receive whatever stimulus the drug may confer, without, however, affecting the virus. To be sure the conditions *in vitro* are not identical with those *in vivo*, but it must be admitted that a suspension in broth of living grattaged tissues containing active virus is as close an approximation to the original as can be artificially obtained. The experiment is similar in every way to that used in testing the potency of antiviral sera, which is the example par excellence of indirect, not lethal, action on viruses. It appears to the writers, therefore, that the complete inability of sulfanilamide to alter the infectivity, and the failure of the drug to render the disease asymptomatic are mutually confirmatory evidence of the resistance of the virus of trachoma to the drug.

Summary

Trachomatous tissues capable of inducing specific infection in monkeys were subjected *in vitro* to the action of sulfanilamide. The time of exposure to the

drug was from four-and-one-half to five hours at room temperature and the final concentrations of sulfanilamide tested were 1:300, 1:3,000, and 1:30,000. The experiments were controlled by exposing the same tissues in similar fashion to an equivalent volume of physiologic saline. After contact with the different solutions, the tissues were tested for infectivity. Under these conditions, it was not possible to demonstrate that sulfanilamide has any appreciable effect on the infective capacity of the virus of trachoma.

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PSYCHOLOGIC PROBLEMS IN OPHTHALMOLOGIC DIAGNOSIS

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Ophthalmology is said to be the most exact branch of medicine. Retinoscopy and ophthalmoscopy permit of objective methods for testing the function and the anatomic state of the eyes. Additional methods, by means of the ophthalmometer, the tonometer, the slitlamp and corneal microscope, and the exophthalmometer, as well as objective tests—such as for visual acuity with test lenses and perimetry—provide for nearly mathematically correct results.

Every-day practice, however, teaches us that this is only theoretically true. There are a great number of cases in which serious difficulties in diagnosis arise even after the most complete examination. Often the meaning of findings has to be discussed: whether a certain appearance of the optic disc is still normal or already pathologic; whether a headache originates from a minor ocular trouble or refractive error, or from some general condition; and a great many other questions.

More frequently, psychologic views have to be considered to establish a correct ophthalmic diagnosis. For example, there is no evidence of mathematical exactness when a patient complains of his eyes and there are no "objective" findings; or when certain objective findings suggest the proper treatment, but the complaints do not cease. In such cases, when no other pathologic condition, general or neurologic, is responsible for the ocular complaints, we ask ourselves why it is that the eyes are the outlet for psychogenic symptoms. Of course, each organ or system of the human organism can be the site of psychologically conditioned troubles. But the projection of such symptoms into the eye is more frequent. The eye is embryologically a part of the brain; it is the chief organ of communication with the outer world. Speaking psychologically, the eye has to face, has to see the whole of the hostility brought about by the struggle of and for daily life. Thus the eye is the very organ where psyche and soma meet in the most ostensible way; it is the junction of the inner and the outer personality.

For diagnostic purposes, we have to

distinguish three categories of patients: (1) those in whom there are organic findings, a real "disease," but the classical picture of the symptoms is blurred or complicated by additional psychogenic symptoms; (2) the true neurotics in whom the syndrome is conditioned merely psychogenically; (3) mentally sound individuals, with neither "organic" nor "neurotic" symptoms or signs, in whom temporary difficulties of life shift the mental trouble to the eyes as an outlet: a conversion symptom as to its appearance, but of a different meaning, and probably of a different origin.

In the first group, we may, of course, find neurotic and non-neurotic persons. As for the third group, it may be extremely difficult to exclude neurotic trends of any kind. But there can be no doubt that there is a difference in psychogenic symptoms in neurotic and non-neurotic persons. Neurosis is the way-out into disease created by a more or less (subconscious or unconscious) wish to be sick or to become so, and to remain so. On the other hand, in mentally sound persons, the conversion of a psychic problem or trouble into similar symptoms is always accompanied by the desire to be healthy again as soon as possible. Neurotic characters show the tendency to remain ill: one symptom cured, they soon develop another; symptoms shift from one organ to another. This never happens in otherwise mentally normal persons who are temporarily unbalanced at meeting obstacles of daily life.

Even though this classification could not stand the test of orthodox terminology, it is of great moment for prognosis and therapy. True conversion (neurosis, hysteria) changes symptoms, but never the way and trend of reaction. Pseudo-conversion, however, psychotherapeutically influenced, permits of a hopeful prognosis. Sometimes, it might be even more practical not to speak of conversion at all. It often is only one of the symptoms of a more complex condition, as to whose origin we are still very much in the dark.

The following case histories may illustrate the points brought up.

GROUP 1

Case 1. Mr. M. M., 78 years old, came for advice for the first time four months ago. He had already consulted a number of good eye specialists during the previous year. One of these doctors, he complained, wanted to operate on him. As he did not want to undergo surgery, he went to see the next physician who said that there was no necessity of operation on the eye. This second physician was "all right," but he did not have time to listen to him. Therefore he saw another oculist who had the understanding he wanted and needed, but this man's nurse "insulted" him; so he preferred not to go back, although he did not have anything against the man himself. I am his fourth doctor and so far the patient has not changed again. But he is always eager to argue, and to be on the alert. This patient is of the highly nervous type, frequently getting flushed, trying to find out "what is wrong"; there is no doubt that there are slight ideas of reference all the time.

Arteriosclerosis and high blood pressure had induced large embolic processes of both retinae, about one year ago. Central vision was destroyed, and large areas of degeneration in and around both maculae luteae made distinct vision impossible. Beginning cataracts of both eyes impaired central and peripheral vision, too. Weak plus cylinders were prescribed by the last oculist whom the patient had seen. Distance vision was 1/5 excentrically only in each eye; near vision was insufficient to enable him to read small or medium-size print.

Of course, this very bad ocular condi-

tion had not influenced the patient's mood favorably; the more, as treatment for over a year failed to improve his sight as he had expected. When I saw him first, I told him that I could probably not do for him what several good physicians had been unable to accomplish. I told him that I feared the effect on him of any emotional rise of blood pressure, and of any excitement at all. He could coöperate by resting and maintaining a placid frame of mind; if he would try to keep quiet as much as possible, and be patient, he probably would see very soon that there was some hope. At each visit I told the patient that I was satisfied, and that there was no reason to be desperate. Patiently I listened to his hundred and more complaints the greater number of which had nothing to do with his disease. When a fresh hemorrhage occurred in the retina of the left eye, he did not even notice it, but was convinced that he was getting along all right. When I tried to let him wear a pair of lenses correctly prescribed by one of his previous ophthalmologists he complained of a "terrific" pain that nobody could stand; the same lenses taken out of my test case were "fine" and "soothing."

This "nervous" patient has lived all his life under a mental strain, and has always been highly excitable. His sister confirmed this, and added that he liked to "fight." One day he was in a great state of excitement because somebody had called him a highbrow, because he had not recognized the other man on the street; of course, he realized that his poor vision was responsible for it. He is easy to handle when his "mental overlay" is considered as practically more important than his real "disease"; when he is permitted to talk freely about his many complaints, whether in connection with his eye trouble or not. This "talking over things" relieved him, he stated, and helped him in every respect.

GROUP 2

Case 2. Miss Alice M., 26 years old, introduced herself as a high-school teacher. She came for a regular check-up of her lenses; therefore, her myopia, of the nonprogressive type, was corrected. The new glasses gave normal vision and were more satisfactory than the old ones, which were too strong. The patient felt much better with the new modern frame, which was less conspicuous than the old one, and which made her believe that, from now on, she would succeed better, because she was better looking.

There is a whole complex of feelings of inadequacy around the girl. She sees her general practitioner frequently for various conditions; but he has found nothing organically wrong; he says she is "nervous." She talks intelligently and in a pleasant way, but is full of inferiority ideas. She was a teacher for one year only, then had a "nervous breakdown." Later on, she was a sales girl, or lived with her mother and did housework. Her gait is heavy, she smiles shyly; she is not plain but has not much personality. She complains that she never gets "contacts" because she must wear glasses. She never had a "boy friend." She does not like to get acquainted with men; they are "not decent." Every time she meets a man he at once wants to touch her, or to kiss her; but she hates physical contact. She denies being homosexual. She complains bitterly of her parents; she was never on good terms with her father, who had died a few years ago. He tried to "educate" her with whiskey when she was not even able to read or write. Her mother, "still young and beautiful," tries to interest all young men who are or could be beaus for herself. This mother has always dominated the home. Thus, the patient feels lonesome and tries to blame persons and circumstances for her own failures and maladjustments. What she really wants is

to be a singer on the stage, or at concerts. Her glasses, however, and her short figure are obstacles. In the meantime she has tried hard to get away from home and her "bossy" mother by becoming a teacher again, but has never succeeded in getting into a school—on the boards of all schools there are only old men ("it is all politics, you know"), and these prefer blonde girls who are more attractive, even if their credentials are not so satisfactory as her own excellent ones. In 1935, she was "blind" for 20 minutes, but did not consult a doctor at that time.

This patient is a true neurotic: everything is flight from something into something else. She does not want to remain the way she is. But there is no doubt that she enjoys the role of suffering; once started, that kind of talk goes on and on. In her character and in her stories are a great many contradictions. It might be that one symptom or one kind of manifestation of her condition can be changed. But the way she reacts to the occurrences in life will always be the same. I have corrected her refraction; the next time something else will have to be corrected.

Case 3. Mrs. Viole H., 24 years old, a housewife, was sent in by her family doctor, who could find no sensible reason for her constant complaints of "dizziness." Organically, everything was "normal." The patient was not satisfied with her glasses—minus cylinders. I therefore corrected the lenses; a minor change gave normal vision (20/20), and took away every possible strain from her eyes. The eye grounds were normal, the pupils equal and round, reacting promptly to light and accommodation. There was supraorbital neuralgia on the left side and in both eyes a moderate conjunctivitis. Visual fields were normal for limits and colors; there was no central nor paracentral scotoma. In other words there were many minor changes which, however, could not be held responsible for the dizziness as representing either ocular or cerebral origin.

Because of this patient's reactions it seemed best to become better acquainted with her mental attitude. She began telling her whole story even before she was asked to do so. There were a great many complaints, chief of which, and always mentioned, was dizziness—but, she corrected herself, although she never was able to walk without feeling dizzy, it was not a "common dizziness," but like a feeling as if she had "no thoughts" for a moment or so. She never lost consciousness, however, nor fell down while these sensations lasted. She also complained of being nervous; her hands perspired and shook.

She believed her main difficulties to come from her marital maladjustment. Her husband is "mean," he pushes her, does not talk to her, does not appreciate anything she does. She always has been "ambitious" to be a good wife and housewife, and to have children; although she feels that this is not the right time to bring children into the world. But when she brought up this subject, telling her husband how much she wished to become a mother, his answer was he would divorce her as soon as she had her first child. He is drinking heavily, and stays out during the night until one or two in the morning. She has been drinking, also, since her marriage, until but quite recently; she now smokes "quite a bit."

She says she has changed since she was a child; she was a "jolly" girl, her father called her a "devil." She went to school until the seventh grade, was at 15 schools because her father was never settled, and thus they were moving all the time; he drank, too, and argued a great deal with her mother. Then she worked as housemaid, salesgirl, waitress; but this she did always for a few months only, because

she got sick, or had to leave for some other reason.

Her educational background is very poor. I asked her to write me a short survey of her life. There were a great many mistakes in grammar; the spelling was extremely poor, the vocabulary more than simple. She stresses in it what she likes—housework, scrubbing, cleanliness; fishing, sport; dancing and tap-dancing—because all this gives her "fun." Her father had promised to let her have dancing lessons, because she wanted to be a stage dancer; but she never had them. In this survey she wrote that she likes reading; a few days before, however, she said she hated it, because it "gets to her stomach."

She claims to be religious, but never goes to church. She seldom goes to a show: her husband does not take her out. She is not interested in politics, does not know even the simplest things concerning them: she has no idea what a governor is for. A definition of "mayor" is likewise poor.

There is no doubt that she is "normal" in the usual sense. But she is underdeveloped (hypo-pituitary?), mentally like a child. To be jolly again, to have fun, are her highest claims. She is not satisfied, and she has a definite feeling that her attitude toward life is unsatisfactory; but she does not like to argue with herself, does not know how to change her attitude. She blames herself a great deal; but all her feelings are flat and superficial. It might be that there is somewhat of resignation; she could have done better before she was married, and she did not. She likes to have friends, and she has a few. But this is not a true social desire; she just talks "monkey business" with them.

I have advised her to try to get along with her husband, and try hard to keep him away from drinking. But there is not much hope that she will succeed, because of the utter lack in her personality. This is why I could never have encouraged her to divorce her husband. She will not be much better off with any other. I feel it would be best to let her have a regular occupation, although it is doubtful whether she would be able physically to continue over a longer period of time.

Thus her slight imbecility and infantilism, her lack of interest in the real problems of life, her education, her poor family background, and her own very poor background merge to build up a person who seems to be unhappy, but is just feeling all these things very superficially, not deeply enough to make her really unhappy. It may be that a short time after this girl got married, her husband knew that she could never be the right wife for him. So his reaction came. His utterly bad treatment of her must be seen and judged from his side, too. I did not see him, so this is only a guess. Now, however, as this girl is dominated in a bitter way, and does not see how to escape this treatment, whereas she likes "fun," she is really desperate, again, of course, within the poor limits of the possibilities in her small personality.

This situation might create a psychogenic reaction. The condition of her eyes, the glasses which have been "too strong": she shifts the attention from her soul to the external condition, from one which she cannot grasp to another of which she can get hold. This means that we are dealing with a true neurosis. The physical complaints and signs are not important in comparison to the situation as a whole. Even if there had been a temporary relief with the glasses, and the "dizziness" had ceased, she would have "shifted" to some other condition more or less important and again be "out of balance." A cure might even be difficult if the marriage were to become satisfac-

tory again, since there are so many reasons in life from which trouble may arise. I feel that this patient will never be able to meet the problems of life in a satisfactory way.

GROUP 3

Case 4. Mrs. Jane C., a clerk, was wearing weak plus cylinders which give her normal vision. Both conjunctivae were slightly hyperemic. These anomalies could not be held responsible for her many eye complaints. While she talked about her troubles, she did not even wait for an answer, or a reply that she might get relief. The eyes are the chief source of her many discomforts, she says, but there are also many other things to make life "unbearable" for her: the office where she works is a "madhouse"; her home life is quiet and all right. Might it be that it is too quiet? There are things in it about which she could not speak. Right after this statement, she began speaking of a severe marital maladjustment which makes everything difficult. She mentions the details of this disharmony, which are not unusual.

This patient is normal in the usual sense, neurotic trends could not be proved. She is very particular about all her duties, and although home life is not pleasant to her she tries to be a good housewife, and there is some satisfaction and happiness nevertheless.

The present difficulties of her marital life have made her temporarily unbalanced; all her troubles find an outlet in the minor discomfort of her eyes, changes which at other times she probably would not have noticed at all; in other words, troubles which never could have been listed as organic changes. After things were explained to her, and she learned how her reaction had originated, she felt relieved. I know that this relief was lasting, because since then she has sent in new patients who told me that she feels all right.

Case 5. Mr. Harold G., aged 32 years, a clerk, had various complaints in July, 1940. Bright sunshine was bothersome; the light in his office was not satisfactory; after going to a show, he always felt that his eyes were tired. With the glasses which were prescribed, the patient was highly satisfied, and all his complaints disappeared.

On April 15, 1941, the patient came to my office again; he complained of his eyes, but even more of a constant headache which had developed two weeks previously. The eyes were thoroughly examined again, and in addition everything was checked that could be held responsible for the headache. The examination showed no change in comparison with the former results, and the glasses given to him were still correct. The patient looked very pale. He slept well, he said, but his appetite was poor, and he felt ill in general. Asked whether there could be some other reason for his condition, he began to tell his story: He had been divorced in February, 1941, but had hoped that this divorce would be revoked. He later realized, however, that there was no hope of this. Shortly after, he developed this bad condition. He felt "lousy," but denied having had a "nervous breakdown." He had tried hard all the time to keep on with his daily routine and work.

Talking over this situation with the patient, and explaining to him the mechanism of the development of his headache, his eye complaints, and his depression, promptly helped him. A few days later, the patient returned, and said that the headache had ceased already. I then recommended that he take a vacation. He accordingly went fishing for a couple of weeks. When I saw this patient the last time, on July 19, 1941, he stated that he had no more complaints, felt "all

right," and wished to try to begin a "new life" again.

Discussion

To establish the diagnosis of a psychogenic origin of eye symptoms, we must make a complete examination in order to exclude everything which might be organic. This should include a thorough testing of the pupils, of the visual fields for borders, colors, scotomata, and hemianopsia. This done, we have to complete the history in order to exclude other diseases or syndromes which could arise from other organs. If all this is negative, then we are entitled to believe that psychologic problems may be partially or wholly implicated in the case. The psychologic examination that follows must be made inconspicuously. The patient should never suspect that he is considered a malingerer. This would spoil everything. Patience is of paramount importance for such an examination: when the doctor is in a hurry, the patient will not speak. Usually there are a number of routine questions in every examination; the way in which the patient reacts and answers permits a first impression, provided the physician himself has questioned his patient, rather than by way of a form filled out by a nurse or secretary. This first impression, however, and the regular history will not suffice. We must try to obtain an "inner" history from the patient: his childhood, education, background, occupation, spare time, parents-children problem, marital life; his successes and failures; his feelings, his moods. We have to know whether his life includes special problems and difficulties, and what they are. Even in cases in which all this was neglected at the beginning, failure of treatment may indicate the right method.

Some oculists have said that there is no time for a psychologic examination in a large ophthalmologic practice. I feel that there should be time. When such patients are unsatisfied they come back again and again, until both doctor and patient become tired of one another, and eventually the patient decides to look for assistance elsewhere. One thorough examination takes less time, and is more satisfactory. The psychologic test is best done by way of the so-called "small talk," so that the patient is willing to react promptly as in common conversation. It can even be combined at the same time with advice to correct the patient's attitude, to convince him that there is definite help for him; in other words, examination and treatment simultaneously. The examiner must be familiar with the principles of psychology and psychopathology to put the questions effectively, and to persuade the patient satisfactorily. Amateur work must be strictly avoided. It is not advisable to try methods with which one is unfamiliar, such as hypnosis, psychoanalysis, and the like. In this latter regard, I am in agreement with those who say that there is no time for it in an ophthalmologic practice; and, one may add, without experience no benefit will accrue to the patient.

Headache often accompanies organic eye diseases, such as iritis, and glaucoma; also the anomalies of refraction, accommodation, and muscular balance if not, or not satisfactorily, corrected. Headaches also occur in psychogenic changes of the eye. This psychogenic headache is not always characteristic; it varies from slight inconvenience to conditions similar to true migraine. Not infrequently, there is a neuralgia of the supraorbital or occipital nerves. Vertigo is a frequent complaint that accompanies psychogenic headache ("dizziness"). Such patients are usually sent to the eye specialist by their family physician when he is unable to find another cause after a careful checkup. Even for the ophthalmologist it may be extremely difficult to diagnose a head-

ache as a psychogenic one. The possibility of a slowly growing tumor of the hypophysis, or of other parts of the brain or its base, can never be excluded after a single examination. Therefore such patients should be watched over a longer period of time. On the other hand, successful treatment may play an important role in making the correct diagnosis.

The patient often explains his mental attitude in connection with eye trouble as fatigue and as states of depression.

Fatigue of the eyes means that the visual organ becomes easily tired, so that work, particularly close work, has to be discontinued before the normal fatigue that is physiologic sets in. There are two sources of eye fatigue. First, the ocular muscles, and second, the nervous apparatus of the eye. The ocular muscles are responsible in presbyopia (accommodative fatigue), and also in insufficiencies of the external muscles, especially the asthenopia from latent divergence. The nervous apparatus becomes a source of fatigue when difficulties in close work arise, such as from illumination, which may be too weak or too strong (glare); from bad posture; from imperfect or too fine print, with insufficient contrast between black and white and with insufficient space between words and lines; from too minute needle work: organically, when one or both eyes are diseased, mainly from changes in the optic nerve, the retina, or choroid, or opacities of the media; and psychologically, by psychogenic origin, when the entire personality is changed, as in neurasthenia, hysteria, and such conditions. All these factors have to be considered when there is a complaint of fatigue. Often some of these changes work together, so that any of them must be taken care of before the complaints cease.

Frequently, the physician has to be aware of the patient's attitude: fatigue is often admitted voluntarily; depression, on the contrary, is rarely discussed.

Case 6. T. T., aged 58 years, a male white clinic patient, is an illustration of concealed depression. One of his eyes was blind; the other, almost blind. Several refraction tests with the best glass possible did not improve the function of his only eye. Nevertheless the patient was asked to return for another test. We knew that not much more could be done for his sight, but I did not want to make him desperate. It might be, he was told, that eventually a lens would be found which then could give satisfaction. The patient, however, felt the true sense behind my words: that his was considered to be a hopeless case. A few days later, a short note in the newspaper: he had drowned himself, leaving a letter which made it obvious that he had been fully aware of his condition, and of my opinion about it. He felt he was doomed to live as a cripple, the note ran, and he did not want to.

States of depression may result from the ocular condition itself: pain, itching, easy fatigue, inability to see distinctly or to work, photophobia, excessive lacrimation, and discharge. A great many patients become depressed when the appearance of the affected eye is conspicuous, as it is in superficial inflammations, edema of the lids, twitching of the lids. Even in hordeola, when the edematous lids cannot be opened in the morning, the patient is afraid of "going blind." Not infrequently, we have to deal with a patient's objection to his appearance with glasses when they have been prescribed against his will and he does not believe them to be necessary.

A second source of depressive states develops when the patient is given the diagnosis and surgery is suggested. Even when this is done very carefully, a shock effect may follow. Laymen fear cataract, but they do not feel uncomfortable when told they are suffering from glaucoma. In some cases it may be wise to withhold

the diagnosis. But when such patients see another oculist who tells them, they feel disappointed that their disease was diagnosed too late. In telling them substitute diagnoses, such as lens opacities for cataract, or high pressure of the eyeball for glaucoma, we have to face the danger that the patient may learn the true names from someone else, and lose all confidence. I feel the best thing to do is to use the correct name, but to minimize the danger as far as possible. A beginning cataract, of course, only visible in maximal mydriasis, need not be mentioned at all. I prefer to say that there are some changes that are frequently seen at such an age, and therefore I should like to watch the condition so that nothing may happen. In glaucoma, the patient has to be under constant control, and he should know about the seriousness of his condition. But before this is discussed with him, also when immediate surgery is indicated, a sufficient miotic should be instilled in both eyes to prevent an emotional rise of tension.

All these considerations mean that it is equally important not only to make the correct diagnosis, but to tell the patient such a way that his depression subsides, or does not even develop. A thorough dynamic, psychologic understanding makes the contact with the patient easier, and helps greatly in the treatment.

Some difficulties in diagnosing psychologic visual disturbances have been mentioned in a previous paper.[1] As a chief distinguishing feature, it was stated that the hysteric patient *cannot* see, while the malingerer *will not* see. It was suggested that it is better not to speak of amaurosis or amblyopia in psychogenic cases, but rather of pseudo-amaurosis or pseudo-amblyopia, since amaurosis means the inability to see while in psychogenic cases there is a definite ability to see, but it is not made use of; and, similarly, in amblyopia and pseudo-amblyopia. In another communication,[2] I reported a case of true amaurosis not diagnosed before I saw the patient, because her mental deficiencies were such that it was extremely difficult to make a satisfactory examination.

There are mental conditions originating from ocular changes which would not be called psychogenic in a strict sense. The more our knowledge broadens and deepens, the more the scope of psychogenic symptoms seems to become narrowed. The influence of hormonal organs upon each other, of the various hormones upon the structures of the body, either directly or by way of the autonomous nervous system, has taught us that a great many so-called nervous symptoms or psychogenic reactions eventually are of somatic origin. The same is true according to recent research work on vitamins, especially that concerning riboflavin; several authors have described ocular symptoms which were previously considered as nervous. Aniseikonia, and allergy, if successfully treated, no longer cause "nervousness" as they previously did. On the other hand, we do not yet know whether all this recent knowledge will not have to be corrected in reverse; that is if the highest nerve centers originally caused these physical changes. This would mean that the mental consequences of somatic changes are due primarily to cerebral or mental changes. Such an insight would even establish a broader idea of the term of body-mind-unity than has been previously taught.

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NOTES, CASES, INSTRUMENTS

BITEMPORAL CONSECUTIVE OPTIC ATROPHY WITH DRUSEN OF THE OPTIC PAPILLA

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The following case report is presented because it falls into the group so ably described by Samuels[1] in a recent article and substantiates in some measure his findings.

A 58-year-old colored female was admitted to the Medical Service of the Cincinnati General Hospital with a history of progressive loss of vision in each eye. The condition was unaccompanied by pain and had been noted for the past four months. The patient likewise complained of substernal pain accompanied by a cough productive of mucus, by nausea, and inability to retain food.

Ophthalmic examination revealed the following findings: *Right eye.* There was no light perception. The cornea was clear, the chamber formed and clear. The pupil was equal in size to that of the left eye, each measuring 5 mm.; neither reacted to light. The lens of the right eye manifested early senile changes. The fundus showed temporal atrophy of the nerve with an area of elevated hyperemia appearing at the superior temporal nerve border. The remaining examination was negative for pathologic processes save for moderate arteriosclerosis; the macula appeared to be normal. The *left eye* was also amaurotic. The cornea was clear, the media were optically clear; the lens showed early senile changes. The fundus of the left eye, however, revealed marked temporal pallor of the nerve, more pronounced than in the right eye. The findings in the remaining examination including vascular bed and macula were essentially normal. There was a paralysis of all the extraocular muscles of both eyes excepting the elevator group. Tension to the fingers was normal in each eye.

Physical examination revealed a dehydrated and emaciated colored female, very disorientated.

The findings in the right side of the chest suggested a carcinomatous process.

Neurologic Examination. There was loss of olfactory sensation, likewise evidence of a mild generalized muscular atrophy, but no signs of localized weakness. The patient was unable to perform coördinated movements. Her tendon reflexes were reduced in the upper extremities and absent in the lower. Abdominal reflexes were absent, and Hoffman's sign was negative.

Radiologic Examination and Bronchoscopy. Diagnosis: Primary carcinoma of the lung with metastasis to the pelvis and brain. Skull plates taken in anterior-posterior, lateral, and oblique views were negative for evidence of bony erosion.

Spinal-fluid findings showed a persistent elevation of pressure ranging from 200 to 400 mm. of water; the cell count was recorded between 6 and 27 lymphocytes. The gold curve was 000112100. The spinal-fluid Wassermann test was negative, and the protein content was 118 mg. percent. The blood Wassermann and Kahn tests were repeatedly taken and recorded as negative. All reports of the blood chemistry were within normal limits. Urinalysis was negative.

Medical diagnosis was: (1) bronchiogenic carcinoma with (2) metastasis to the frontal lobe, and (3) possible meningioma of the frontal lobe.

Ophthalmic diagnosis: Bitemporal consecutive optic atrophy with intracranial neoplasm and possible extension of the carcinomatous process along the inter-

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Fig. 1 (Brumm). A, right eye: Druse of the papilla, D, in area of the sclerochoroidal ring, nasal side. Temporal side of nerve reveals evidence of atrophy. B, left eye: there is no drusen formation; however, there is evidence of optic-nerve atrophy. (Photomicrographs by Mr. Homan, College of Medicine, University of Cincinnati.)

vaginal space (first described by Elschnig in 1892). Throughout the patient's brief hospital stay there was no tendency toward improvement, mentally or physically, and on her twenty-first hospital day she died.

Pathologic diagnosis was: (1) bronchiogenic carcinoma and (2) extensive carcinomatosis of the meninges.

Fortunately the posterior segments of both globes were obtainable. The sections through the optic nerve of the right eye revealed a laminated druse on the nasal side of the papilla in the sclerochoroidal area, surrounded by endothelial cells (fig. 1, A). The nerve showed demyelination and gliosis, especially on the temporal side. There was no evidence of tumor cells along the nerve in its course posteriorly (5 mm.).

The area of hyperemia and edema in the left eye (fig. 1, B) was represented by dilated vessels with no further evidence of pathologic processes on the superior temporal quadrant of the disc. There was no drusen formation of either the papilla or remaining fundus.

Neuropathologic report (section taken through the basal meninges): There was a diffuse infiltration of the nerve sheaths and adjacent basal meninges by the tumor, with resultant compression of the optic nerve along its course. The sheaths and basilar meninges surrounding the optic nerves were infiltrated by tumor cells, but none were discovered in the nerves themselves. Diffuse demyelination and edema were demonstrated with Loyez stain, while a well-defined neurofibrillar degeneration was demonstrated with Brodian stain.

Discussion

According to Parsons,[2] H. Mueller in 1858 first described drusen of the optic papilla in a patient with an atrophy of the nerve. In 1868 Ivanoff described the condition associated with optic neuritis. Liebriech was the first to observe the drusen ophthalmoscopically, describing them as reflecting the light strongly, and noted that they may extend beyond the choroidal ring and nerve and may be missed. Stood in 1883 described the lesion in two cases with doubtful optic neuritis.

Of the original 42 cases recorded, seven

revealed an associated retinitis pigmentosa together with an associated diminution of light and color sensation. Nervous disorders accompanying the presence of drusen were recorded in seven cases. There remains a considerable group of cases in which the patients were otherwise normal both as regards local condition and general bodily health.

In reference to the case herein described, the druse was not seen ophthalmoscopically. Pressure atrophy was a factor associated with demyelinization and gliosis, a very salient factor, as was suggested by Samuels[1] when he listed the occurrence of hyaloid bodies and secondary glaucoma and retinitis pigmentosa, each characterized by a proliferation of glial cells in the papilla and retina.

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RETINAL HEMORRHAGES FOLLOWING THE INGESTION OF SULFATHIAZOLE

Report of two cases

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Two patients have come under my observation within the past year that lead me to believe that the retinal blood vessels of certain persons may be injured by the ingestion of sulfathiazole.

Case 1. Mrs. R. F., aged 34 years, had an attack of pneumonia due to type-1 pneumococcus late in December, 1940. On January 1st the right upper lobe was consolidated, and she had intense headache, with some rigidity of the neck and a normal spinal fluid under increased pressure (22 mm. Hg). She was placed on 1.0 gm. of sulfathiazole to be taken six times daily. As the blood concentration was low this was raised to 1.5 gm. six times daily, later to 3 gm. every four hours during the day, with two 2-gm. doses during the night for 24 hours. She then received 9 gm. each 24 hours for five days. On January 7th she complained of blurred vision. By this time her general condition was excellent and she could read ordinary print with either eye. In the retina of the right eye there were four globular hemorrhages close to the disc. Up and temporally in the left eye was a preretinal hemorrhage about 3 disc diameters in size. On June 14th she could read only the headlines of the newspaper, and there was a discrete spherical hemorrhage in each macula. These had appeared since the last examination. The other hemorrhages were fading somewhat. On February 7th her vision was R.E. 20/30—3, L.E. 20/100. With the right eye she could read J 2, with the left eye J 3, with difficulty. The blood had been largely absorbed and some grayish pigment spots could be seen in each macula. There was a relative central scotoma in the visual field of the left eye, none in that of the right. This patient showed no evidence of renal disease, of blood dyscrasia, or of disease of the vascular system.

Case 2. Mrs. W. S. R., aged 37 years, had been treated for three days with sulfathiazole to relieve an infected tooth socket which would not heal. She received 10½ gm. of the drug. The physician in charge said the patient complained of blurring of her vision the day after

the drug was started, and he expressed the opinion that the drug had nothing to do with it. She was referred to an ophthalmologist who reported that he found nothing pathologic. Three weeks after taking the sulfathiazole she consulted another ophthalmologist, who reported his findings as follows: "Vision R.E. 20/400, L.E. 20/25. R.E. In the macula there is an area in which the retinal elements are destroyed; just medial to that there is a cherry-red spot of hemorrhage with a sharp line through the center, showing the upper limit of gravitated blood. The retina of the left eye is normal." When I saw her, a week later, the blood had almost disappeared from the macular area but there was a discrete circular area beginning to show slight pigmentation. Her corrected vision was 20/30 — 2, and she had a small relative scotoma. The other retina appeared normal. There was no evidence of sclerosis of her retinal vessels.

It is of course impossible to be certain that these retinal lesions were due to sulfonamides but it is highly probable that they were. It is well known that petechial hemorrhages may occur in the skin and hemorrhages from the urinary and gastro-intestinal tracts have been reported following the ingestion of sulfonamides. If retinal hemorrhages are looked for they will probably be found more often than we suspect.

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TRUSS FOR APPLICATION OF PRESSURE TO THE EYE

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The ordinary elastic bandage used for application of pressure to the eye or orbital region, though well tolerated for short periods of time up to four days or a week, is very uncomfortable if used for long periods of time, such as becomes necessary in the treatment of keratoconus, in which continuous pressure must be maintained for approximately 10 weeks.*

* Terry, T. L., and Chisholm, J. F. Jr., Studies on keratoconus relative to the effect of prolonged application of pressure. Amer. Jour. Ophth., 1940, v. 23, p. 1089.

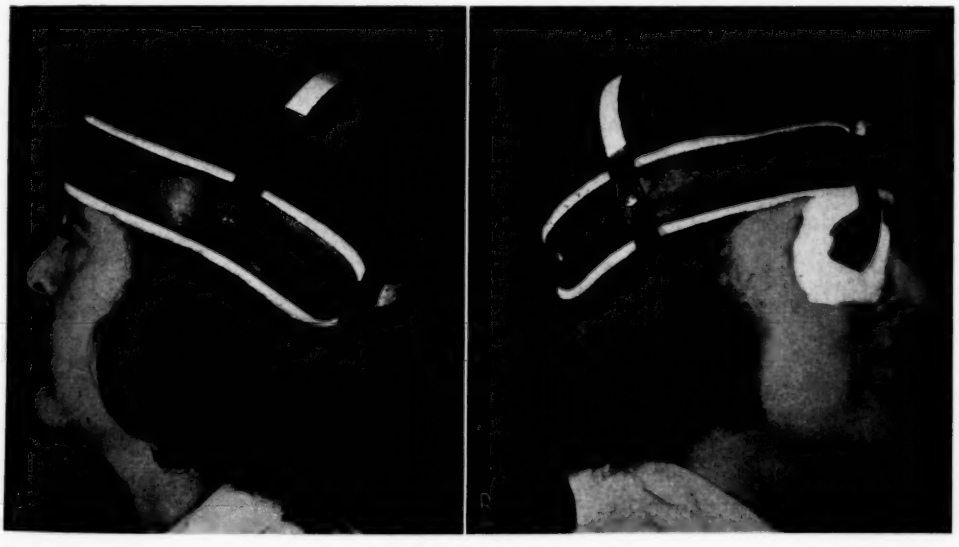

Fig. 1 (Terry). Truss for right eye. A, truss in place with straps attached at back and across head. B, note offset and oval plate. Desired pressure is obtained by varying the amount of cotton.

Even with considerable attention to the skin surface, excoriations often occur on the forehead and around the ears. In hot weather, constant use of the bandage is so uncomfortable that the patient has difficulty in continuing the treatment. Then, too, the application of the bandage is complicated and cannot be done efficiently by the patient's relatives.

The question of obtaining constant pressure on the eye was presented to Pomeroy Company,* makers of surgical appliances, to see if a truss could be devised that would be more satisfactory than the elastic bandage. This problem was placed in the hands of Mr. Kenneth McKay who fashioned an incomplete loop of 18-gauge medium brass seven eights of an inch wide to surround the head just above the brow with the open space at the back. Stud screws were placed at intervals for attaching leather and elastic straps to maintain proper tension and to support the truss across the head (fig. 1A). The band was covered with cotton felt, the outer surface being faced with leather. An offset of brass extended down in front of the eye to which pressure was to be applied, and at its end an oval plate was riveted (fig. 1B). Brass was used since it permits easy shaping but after being shaped holds its form well. Although it was desired to keep the truss simple and inexpensive, doubtless attachments could be added to vary the amount of pressure on the eye while the apparatus is in use.

This truss has proved very satisfactory and does eliminate many of the difficulties encountered with the elastic bandage. The truss is light and relatively comfortable. Pressure can be easily adjusted by varying the amount of cotton placed under the oval plate. The truss can be readily applied by the patient. For use by other patients, it can be reshaped and recovered.

243 Charles Street.

* Pomeroy Company, 41 West Street, Boston, Massachusetts.

SCLEROTOMY SCISSORS*†

CONRAD BERENS, M.D.
New York

The sclerotomy scissors previously described‡ have been found useful in completing the cataract section and in performing other operations in which it is important to have strong scissors for cutting through the sclera, especially when the surgeon desires to cut the sclera in the same plane as that followed by the cataract knife.

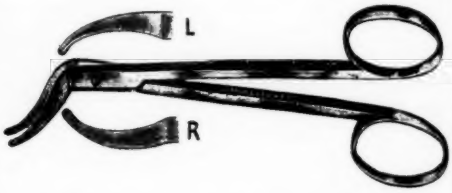

Fig. 1 (Berens). Sclerotomy scissors.

However, as strong as these blades were they sometimes buckled because no finger pressure could be placed upon them to keep the jaws from spreading. Therefore, right and left scissors have been constructed with the conventional scissors handles but with the blades making a more obtuse angle with the shafts (fig. 1).

The shafts are 90 mm. in length, and the blades 18 mm. The width of the blades is 5 mm., tapering to 1 mm. at the tip. The blades make a 50-degree angle with the shaft.

35 East Seventieth Street.

* Made by V. Mueller and Company, Chicago, Illinois.

† Aided by a grant from the Ophthalmological Foundation, Inc.

‡ Berens, Conrad. Sclerotomy scissors for enlarging corneal incisions. Amer. Jour. Ophth., 1939, v. 22, p. 304.

SOCIETY PROCEEDINGS

EDITED BY DR. RALPH H. MILLER

CHICAGO OPHTHALMOLOGICAL SOCIETY

December 16, 1940

DR. RICHARD C. GAMBLE, *president*

CLINICAL MEETING

(Presented by the Department of Ophthalmology, Illinois Eye and Ear Infirmary)

ABLATIO FALCIFORMIS CONGENITA, OR RETINAL SEPTUM

DR. IRVING SCHUMAN said that the patient, a young Negro, showed in the inferior nasal quadrant of the fundus of the right eye a cordlike retinal fold that extended from the region of the disc to the ora serrata. The fold had a brilliant white color, whereas the surrounding retina showed the usual transparency. The fold extended somewhat beyond the disc into the superior temporal quadrant of the fundus and then curved down toward the 7:00-o'clock position, where it gradually flattened out and became invisible. The patient also showed in the right eye a tubular white formation extending from the region of the disc to the posterior pole of the veins, apparently a hypertrophic glial sheath around a persistent hyaloid artery.

The case belonged to a definite clinical group to which the terms "ablatio falciformis congenita" or "retinal septum" have been applied. It is an embryologic anomaly in which adhesions of the primary vitreous to the inner layer of the optic cup have occurred. A secondary vitreous could not form in these places of adhesion and subsequently folds of retina, exclusive of pigment epithelium, were pulled into the eye.

CORNEAL INFECTION FOLLOWING CORNEOSCLERAL SUTURE

DR. W. BUTNER said that the patient, a Negro, aged 41 years, was admitted to the Infirmary on May 16, 1940, with the complaint of gradual loss of vision in both eyes for the past five years. Examination showed bilateral presenile cortical cataracts superimposed upon blue, punctate opacities situated within the adult nucleus. On May 25th, an extracapsular lens extraction was performed on the right eye. The recovery was uneventful. On June 15th, an intracapsular lens extraction was performed on the left eye. Two corneoscleral sutures (Verhoeff) were inserted during the operation. On the following day the cornea was clear and the anterior chamber restored.

On June 18th, there was marked, mixed injection. The entire cornea was faintly hazy, and there was a white infiltrate in the corneal stroma around the temporal corneoscleral suture. This suture was removed and typhoid vaccine (15 million organisms) was given intravenously. The next day the infiltrate in the cornea was larger. A subconjunctival injection of mercury cyanide (1:1,000 solution), sulfanilamide (15 grains four times a day), and a second dose of typhoid vaccine were given. Despite this the infiltrate continued to spread downward and nasally, and a hypopyon developed. On June 22d, a delimiting keratotomy was done on the line from the 9:30- to the 3:30-o'clock positions. On the subsequent four days the corneal incision was reopened daily, chemotherapy and fever therapy were continued. The infiltrate became stationary except in its most nasal portion, which

for a few days progressed, skirting the nasal end of the keratotomy. From July 1st on, the entire infiltrated area showed signs of regression.

On September 14th, an optic iridectomy was performed at the 6-o'clock position. This was followed by needling on October 26, 1940, at which time a hole was made in the inflammatory membrane situated immediately behind the coloboma. The patient's corrected vision in the left eye became 20/70.

Diabetic cataract

Dr. L. V. Wachs said that E. C. Y., a boy, aged 16 years, was seen in the clinic on November 17, 1940, because of poor vision. The patient had had uncontrolled diabetes until November, 1938, when a diagnosis of diabetes was made. Since then he had been under diabetic management, receiving 214 grams of carbohydrates, 95 grams of proteins, and 107 grams of fat, making a total of 2,200 calories daily; and this was fortified by 65 units of protamin-zinc insulin daily.

Fasting blood sugar on December 11, 1940, was 222 mg. per 100 c.c. of blood. The patient had had a glycosuria of four plus. The uncorrected vision in each eye was 20/200, not improved with glasses.

Examination showed both corneae to be normal. The irides were thickened and hyperemic. The pupils dilated very poorly. The capsule, epithelial layer, and most recent layer of cortical substance were normal; there were no water clefts nor spreading of sutures. Approximately in the region corresponding to the zone of disjunction in the normal lens, the opacities began in a sharply defined zone. In this area there were countless, fine, droplike, snow-flake opacities, interspersed by many fine, sandlike, double-refractile bodies.

In addition to the typically diabetic opacities there were in each lens grayish-white opacities in the subcapsular area which, according to Vogt, may make up part of the diabetic picture. Since the patient had been under diabetic treatment, clear cortex had appeared beneath the capsule.

Bilateral detachment with macular hole

Dr. Peter C. Kronfeld said that this patient, a man, aged 33 years (myopic), was shown because of the unusually good vision after an operation for closure of a macular hole. When first seen (April 13, 1940) he gave a history of visual failure in the left eye six months before, and recent loss of vision in the right eye, which was described as resembling a curtain obscuring the field of vision from above downward. Total retinal detachment was present in each eye. In the right eye several tears were found in the lower periphery. In addition, with the ophthalmoscope of Friedenwald, the diagnosis of a hole in the macula was made. This finding was confirmed by several examiners. In the periphery of the upper temporal quadrant there was pigmentation of the retina with suggestion of thinning in several places.

The first operation, April 27, 1940, consisted of multiple diathermic punctures surrounding the tears in the lower half of the fundus. After tenotomy of the external-rectus muscle the posterior pole was exposed and, with a needle 0.2 mm. thick and 0.75 mm. long, a circle of minute coagulations was laid around the macula. The retina became reattached and remained so until August 1, 1940, when the patient returned with recurrence of detachment and new tears which exactly corresponded to the areas temporally above, where pigmentation of the retina had been noted at the time of the first visit. Surrounding of these tears with mi-

crocoagulations (August 13, 1940) resulted again in prompt reattachment.

The corrected vision at the time of the report, December 16, 1940, was between 20/70 and 20/50. In the region of the coagulations around the macula only slight hyperpigmentation was visible. In addition to the unusually good visual result of operation in the macular region, the patient illustrated the fact that prophylactic operations—that is, coagulation of areas of retinal pathology which may develop into tears—may be indicated. In this case such a prophylactic operation would probably have prevented recurrence of the detachment.

Large retinal disinsertion

Dr. Peter C. Kronfeld said that this myopic Negro boy, aged 17 years, showed in the left eye a spontaneous retinal disinsertion extending over the upper half of the circumference. The upper half of the retina formed a roll in the horizontal meridian of the fundus. The lower half of the retina was detached and showed several fixed folds. The condition was considered intractable. In the right eye, also myopic, an extensive retinal detachment with several equatorial tears was present and had responded favorably to surgical treatment.

Streaks after choroidal detachment

Dr. Peter C. Kronfeld presented a man, aged 69 years, a diabetic, on whom an uncomplicated intracapsular cataract extraction was performed on August 3, 1940. The conjunctiva was incised at the upper limbus and dissected upward. Two sclerocorneal sutures of the Verhoeff type were inserted and the conjunctival flap was brought down over the wound at the end of the operation. The anterior chamber re-formed very promptly but was lost again four days after operation and did not become restored despite complete rest. There was disagreement with regard to the presence of a visible fistula. The usual choroidal detachment was present. On August 31, 1940, after the chamber had been collapsed for 24 days, a conjunctivoplasty was made, after which the chamber became restored very promptly and the choroidal detachment disappeared. Despite complete obliteration of the chamber angle the tension varied between 18 and 28 mm. Since reattachment of the choroid there have been noted at several places in the fundus, the typical streaks after choroidal detachment, first described clinically by Schur, Lindner, and Fuchs, and histologically by Verhoeff. According to Verhoeff, these streaks are due to ridgelike hyperplasia of the pigment epithelium, the streaks corresponding not to the borders of the detachment but to creases present in the choroid during the detachment.

Wollaston and hemianopsia

Dr. James E. Lebensohn presented a paper on this subject which has been published in this Journal (September, 1941).

Discussion. Dr. Peter C. Kronfeld said that Dr. Lebensohn had unearthed another fascinating chapter in the history of ophthalmology by giving a vivid account of the life and brilliant accomplishments of William Hyde Wollaston, one of the few true geniuses of the last century. Wollaston's illness and his self-observations pertaining to it were referred to in MacKenzie's "Practical treatise on the diseases of the eye," but few are familiar with the original publication of Wollaston which he presented before the Royal Society of London in 1824.

It may be fitting to complete the history of hemianopsia by giving a brief account of the events preceding Wollaston's publication. The condition called homonymous hemianopsia was known and referred to in writings of the dis-

ciples of Hippocrates. A few clinical descriptions of such cases can be found in the medical literature of the sixteenth and seventeenth century. The first monograph on this subject, including detailed descriptions of three cases, was published in Latin in 1723, 101 years before Wollaston's publication. The author was Abraham Vater (1684-1751), professor of anatomy, pathology, and therapy at the University of Wittenberg, Germany, whose name is attached to the ampulliform entrance of the pancreatic and common bile duct into the duodenum. In his monograph Vater described the phenomenon of homonymous hemianopsia in great detail and concluded that the "optical nerves divide crosswise and reunite in such a way that the right halves of the retinae receive fibers from the right hemisphere and the left halves of the retinae from the left hemisphere." Thus Vater arrived at the concept of the semidecussation of the fibers of the optic nerves in the chiasm. According to Hirschberg, one of the most reliable authorities in the field of the history of ophthalmology, Vater was the first to interpret the occurrence of homonymous hemianopsia as an indication of the now well-established fact of the proximity, in the suprachiasmal visual pathway, of the fibers coming from corresponding retinal points in the two eyes. Without knowing of the disease, hemianopsia, Isaac Newton in his treatise on optics (1700) suggested semidecussation in the chiasm resulting in juxtaposition of the fibers from corresponding retinal points as the most sensible explanation of the phenomenon of binocular single vision.

Since in all these discussions binocular single vision is linked up with semidecusaton in the chiasm, the fact should be remembered that in certain animals with complete decussation in the chiasm the position of the eyes in the head is such that there is at least the possibility of a small binocular field of vision.

In times like these it appears more gratifying than ever to remember the deeds of the scientific heroes of the past.

Dr. James E. Lebensohn in closing was very grateful to Dr. Kronfeld for his contribution to the paper. Though there had been mention of half-vision before in medical literature, he thought that no one had noted half-vision with each eye separately until Wollaston presented this important clinical symptom in his paper. He said it was a tribute to Dr. Kronfeld's wide knowledge that he reviewed so completely the early literature on the subject.

Convergence insufficiency

Dr. Beulah Cushman and Dr. Clara Burri (by invitation) presented a paper on this subject which has been published in this Journal (September, 1941).

Discussion. Dr. Sanford Gifford thought that Dr. Cushman and Dr. Burri had called attention to a very practical subject. He said that a common fault among ophthalmologists was that too much time was spent in thinking about surgical cases with less inclination to give sufficient consideration to common causes of discomfort in their patients. Many patients need something besides correction of a refractive error. Dr. Cushman distinguished between cases of abduction weakness and divergence excess. He said this report applied to many cases that did not respond well to treatment; patients in whom one would think exercises could be carried on fairly well, since they have good fusion and good binocular vision. Some do this, but others require too much supervision to give themselves exercises. The physical condition of the patient should be considered from the

standpoint of thyroid deficiency, chronic infections, and anemia.

One measure he had used to facilitate the patient's carrying on exercise at home had been taught by the senior Dr. Gifford; namely, Gould's method of prisms, base out, in increasing strength. The amount of prism, base out, that could be fused for near was tested, then that for distance, and the patient was given the amount he was just able to fuse. He was advised to practice first fusion for near and then across a 20-foot room, using a small object. When this was overcome he was given the next strength of prism, base out. The strength of the prism was increased until he could overcome 20 or even 30 prism diopters in each eye without difficulty.

He said the slides showing the permanency of the results were interesting, because he had had the feeling that the patients who took exercises would relapse sooner or later. He had always assumed that patients became discouraged and went elsewhere. It was encouraging to know that the results could be maintained by proper refraction before and afterward and by psychologic help. One thing that should be considered was temporary relief. Patients could be given prisms, base in, for reading while carrying on exercises, and later, after exercises, they might be dispensed with.

Dr. James E. Lebensohn called attention to one method of handling cases in young adults that he believed worthy of attention. By adding more minus than the patient required convergence was stimulated, since accommodation and convergence are associated synergistic phenomena. He had thus treated a woman who had diplopia in looking at near objects, with resulting headache and nausea. In prior consultations one doctor had given her muscle exercises which did not help; another doctor advised operation, but did not guarantee a result. Refraction under cycloplegia showed but a negligible error in each eye; +0.25 diopter astigmatism in one, and +0.75 in the other. With a —1.5 D. sph. added to the correction she was able to read without diplopia and attended movies without discomfort.

Dr. Beulah Cushman in closing thanked Drs. Gifford and Lebensohn for their discussion. Morgan, in an article in the British Journal of Ophthalmology (November, 1940) reported an average of 16 treatments necessary, which was in accord with the report in this paper.

Robert Von der Heydt.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

December 17, 1940

Dr. William D. Rowland, *presiding*

Ocular manifestations in myasthenia gravis

Dr. Robert D. Mattis briefly described myasthenia gravis as to the current hypothesis regarding the etiology, incidence according to age and sex, and the predisposing factors. Modifications of the course of the disease were noted. A statistical study of the types of the ocular manifestations and their frequency in a series of 26 cases was given, and they were discussed individually: diplopia, musculature about the eyes, ptosis, pupillary reaction, refractive errors, and accommodative power. A discussion of a typical case of myasthenia gravis and of the diagnostic use of prostigmine was included, with a consideration of the phenomena of the "transient tropia" and the "drifting phoria" and an explanation of their mechanism. The pupillary findings were noted, in the myasthenic and in the

normal, on the injection of diagnostic ampules of prostigmine. The therapy of the ocular complaints was briefly discussed. A moving picture showing typical manifestations of myasthenia, furnished through the courtesy of the Myasthenia Gravis Clinic of the Massachusetts General Hospital, was shown.

Discussion. Dr. Robert S. Schwab said that Dr. Mary Walker, who was a well-known London ophthalmologist attached to the London Eye Hospital, was at a party where Professor Dale was explaining some of the symptoms of curare poisoning. A question was asked as to the clinical symptoms of this poisoning which begins with ptosis, diplopia, and facial paralysis before it spreads to the bulbar muscles. Curare poisoning someone described as very similar to myasthenia gravis in its clinical symptoms, and a guest was told that the antidote for curare poisoning was physostigmine. The next day Dr. Mary Walker found a case of myasthenia gravis in the clinic at the London Eye Hospital, and with the previous day's discussion in mind she injected a large amount of physostigmine and completely relieved the patient's symptoms. The use of prostigmine followed, which was a safer analogue and much more effective. Thus, medicine is indebted to an alert ophthalmologist for the most important therapeutic advance in the treatment of this disease. Dr. Schwab said that he might corroborate one of Dr. Mattis's statements about choline esterase. He ran a number of blood-esterase determinations on controls and myasthenics on and off treatment and found no difference. Secondly, he wished to emphasize that most of the serial-section examinations of the nervous system in post-mortem studies of this disease had failed to show any lesions. In some necropsy material, lymphocytic infiltrations of the muscle have been described, in others they are absent. Such findings are also seen in cachectic states and in patients with considerable wasting of muscles. The feeling is that lymphocytic infiltrations are not pathognomonic.

The question came up as to why the small muscles of the eye are so frequently involved in this disease. A possible explanation is that if large muscles, such as the quadriceps, are tested in myasthenics for fatigue, only a small number will show it, due to the large mass of reserve-muscle fibers that ordinarily are not in use. Dr. Schwab found that in order to get a high incidence of fatigue in myasthenics, a small muscle such as the adductor pollicis must be used. Harvey, in Baltimore, showed an even higher involvement (98 percent) of the adductor digiti quinti. One would, therefore, assume that the eye muscles with small mass and little reserve would be frequently involved.

Clinico- and angioscotometry

Dr. John N. Evans of Brooklyn read a paper on this subject. Dr. Evans said that just as the ancients speculated about a possible relation between certain blind spots and participation of hypothetical blood vessels in their formation, so Mariotte and his contemporaries considered the possibility that the central retinal vessels were a factor in the production of the physiologic blindspot. Two hundred years of philosophic argumentation went by before Ole Bull mapped vessel stumps, and some half-dozen contributions were made previous to the report on the shape and extent of the defect (1925) as we know it today. (For more elaborate historical discussions of the historical aspects of this subject see "An introduction to clinical scotometry," Yale University Press, 1938.) These contributions

had not made evident any clinical possibilities. Description of the widening phenomena in 1926 immediately implied limitless possibilities not only for purely clinical work but for a vast field of investigative studies. As soon as these began to appear they were duplicated by workers all over the world so that the literature of today presents a classical illustration of ophthalmologic evolution of unusual continuity. There are about 30 contributions, not including those of the speaker.

By way of demonstrating the clinical usefulness of angioscotometry, slides were presented. They were taken from especially planned studies most of which have been previously reported. They covered (1) basic anatomy and physiology; (2) the scotometry of edema, oxygen deprivation, glaucoma, nasal-sinus disease, menstruation; and (3) miscellaneous studies. Under the first heading anatomy and physiology were reviewed. The three characteristic distribution plans of the retinal vessels were described: the major system radiating from the vessel funnel and branching diochotomously; those supra- and inframacular arching vessels which send in spokelike loops pointing toward the macula; and the vascular circle of Zinn of the nerve head which sends short extensions into the peripapillary retina.

To this gross anatomy, a few illustrations calling attention to original data on the anatomy and physiology of the perivascular space, and also to the histologic work of Krückmann, were added.

The morphologic characteristics of the angioscotoma were shown, and were followed by a series of illustrations of measures—for example, exposure to light, pressure on the eyes, holding the breath, and so forth—which cause widening of the defect. This group included experiments conducted under conditions of oxygen deprivation (artificial high altitude). In the same group was placed a summary of studies which demonstrated very significant changes during the menstrual period.

The last section of the paper summarized elaborate studies which were previously reported; for example, nasal-accessory-sinus disease, glaucoma, and those conditions that are characterized by edema, whether of local or systemic origin, and whether from inflammatory processes or from circulatory insufficiency.

Though it was necessary to review basic material, special effort was made to demonstrate the direct clinical usefulness of angioscotometry.

Virgil G. Casten,
Recorder.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

December 2, 1940

Dr. Morris Davidson, *presiding*

Aniseikonia

Dr. Wendell L. Hughes discussed this subject and its clinical applications during the instructional hour.

Discussion. Dr. Percy H. Fridenberg remarked that the symptoms of aniseikonia—photophobia, fatigue, vertigo, and nervousness—persisting in spite of careful correction of ametropia are remarkably like those we have been taught to attribute to "eyestrain" or copiopia. It is striking that the subjective disturbances are most marked with minimal degrees of aniseikonia. This is an interesting analogy with the confusion noted in diplopia. When the double images are very close together there is a surprising intensity of vertigo, nausea, and so forth,

while with widely separated double images the "subconscious" accepts the inevitable and resigns itself to fate. He asked if there was any difference in the degree of aniseikonia in different meridians and, again, in far and distance vision.

Dr. Wendell L. Hughes stated that aniseikonia can differ in two meridians, requiring a "size" cylinder. The same applies to the variation for distance and near where corrections have to be given according to the patient's symptoms.

Dr. Walter B. Lancaster asked in what percent of cases of eyestrain (run-of-the-mill, routine office cases) was relief obtainable only by aniseikonic correction.

Dr. Wendell L. Hughes stated that about 46 percent of patients with aniseikonia obtained complete relief and 26 percent got partial relief. This agreed with the figures of other workers. About 25 percent where not alleviated in any way. Not more than 2 percent of cases with eye symptoms have aniseikonia. It is in the cases in which the symptoms are not relieved by other methods that aniseikonia is looked for; in this group the percentage is high.

Dr. Walter B. Lancaster asked Dr. Hughes if he understood correctly that only 2 percent of the patients who have eyestrain might be expected to be cured only by correcting their aniseikonia. The public might get the impression that 46 percent of the cases of eyestrain would show aniseikonia, but that is not what the statisticians claim. They claim 46 percent of the cases with aniseikonia get relief by correcting the aniseikonia. These make up a small percentage of all cases of eyestrain. Of course, most of the cases of eyestrain are curable with ordinary lenses, if skillfully chosen. It is the 2 percent incurable in that way, but curable with eikonic lenses added to the refractive correction, that make the treatment of aniseikonia indispensable if one wishes to be prepared for any and all cases of eyestrain.

Dr. Mark J. Schoenberg asked what percentage of aniseikonia patients had no symptoms. He asked if patients with incipient cataract in one eye presented any symptoms and if changes in the lens produced inaccuracies in the images. He also asked to what age group aniseikonia was most troublesome.

Dr. Morris Davidson asked whether children with aniseikonia were helped in their reading by eikonic lenses.

Dr. Wendell L. Hughes in closing stated that in his opinion about 2 percent of all patients with symptoms had aniseikonia. All people with aniseikonia do not have symptoms, nor is there any age group in which the symptoms are most marked; aniseikonia can be present at any age. Youngsters who have aniseikonia have difficulty in school because they do not read quickly. Corrrection of their aniseikonia can increase their reading speed 100 percent. Aniseikonia is not the only cause of slow reading. Muscle imbalances are also contributing factors.

Induced size effect and its relation to the measurement of aniseikonia

Dr. Kenneth N. Ogle stated that if a meridional "size" lens which magnifies only in the horizontal meridian were placed before one eye, all points on a plane would appear displaced as if rotated about the point of fixation. There would also be an apparent enlargement of distances on the side of the eye having the larger image and an apparent shrinkage on the side of the smaller image. This would be a geometric effect and would be the expected result.

However, if the meridional "size" lens were placed before one eye so as to mag-

nify in the vertical meridian the apparent rotation would be in the direction opposite to that of the geometric effect above. In this case, designated as the induced size effect, the space falsification could not be attributed to changes in the disparities of the images of objects in space because the two eyes are not separated vertically. This phenomenon cannot be explained by a simple geometric interpretation as can the one above. Its exact basis is not yet known, but from a large number of sets of data obtained on many different individuals it has been shown that the sigmoid curve, which represents a given set, is a typical, symmetrical curve, universal for all observers with normal stereoscopic vision, and is present at all distances.

Discussion. Dr. Jacob Mandelbaum stated that in asymmetric convergence there is a difference in the size of the images in each eye. A patient with this condition holds his book to one side and thereby can improve his vision. He wondered if this suggested a mechanism for the correction of aniseikonia, at least for reading.

Dr. Adolph Posner said that space perception is affected by oblique cylinders which make things tip forward. It has also been suggested that a person having a vertical difference can help to correct it by tipping the book when reading.

Dr. Kenneth N. Ogle agreed that when the eyes were in asymmetric convergence there was some kind of compensation which made up for the difference in the size of the images. Eikonic lenses would not help oblique cylindrical errors. While there are individuals who claim that they can get along by tipping a book, there are others who cannot.

Dr. Morris Davidson said that in the induced effect, attention was called to the need for vertically placed patterns. He asked if Dr. Ogle meant that he allowed for free fixation in producing this effect.

Dr. Ogle stated that he allowed for full fixation.

Dr. Davidson said that normally, although our eyes are placed horizontally, we do discriminate depth in the vertical meridian of the world around us. In looking at a sphere there is no vertical aniseikonia and yet we have depth perception. We see it as a sphere and not as a cylinder. Could this be considered as induced size effect?

Dr. Ogle said that the top of the sphere would be farther back because of the horizontal disparity.

Dr. Davidson asked if there would be any horizontal aniseikonia between two points in space placed vertically at different distances.

Dr. Ogle replied that there would be a horizontal disparity below the threshold of discrimination.

Transitory refractive errors

Dr. John H. Bailey presented five cases with this condition. He discussed the theories advanced by Duke-Elder, Granström, and Hudelo. His own explanation is that transitory myopia is due to increased imbibition of water by the lens proteins; and that hypermetropia is due to the temporary loss of water from the lens as a result of diminished imbibition. The theories of increased or decreased density of the aqueous and vitreous were untenable.

Practical application of dynamic retinoscopy

Dr. Joseph I. Pascal gave four applications for this procedure: (1) For finding objectively the amount of accommodation especially in eyes with subnormal vision. Here the subjective method is difficult because of the lack of correlation between the size of type used and

the position of the near point. (2) For checking the depth of cycloplegia and comparing the effect in the two eyes. (3) For comparing the quality and quantity of the accommodation in the two eyes. (4) For checking for a possible overcorrection of myopia in young persons.

Stress was laid on the fact that in the dynamic tests the behavior of each eye can be studied while both eyes are working.

Discussion. Dr. Walter B. Lancaster asked Dr. Pascal what he used for test objects.

Dr. Pascal said the patient might use his own finger. He used the head of a pin sometimes, or various numbers and figures on the retinoscope.

Dr. Samuel Morse stated that this method was in vogue with optometrists. He added that he believed it unwise to depend on dynamic retinoscopy as an exclusive method of refraction. Though it might be satisfactory for the determination of differences in accommodation it could not be used to determine under- or overcorrection.

PRESCRIPTIONS FOR CATARACT AND OTHER STRONG LENSES

DR. SIDNEY OLSHO read a paper on this subject.

Discussion. Dr. Walter B. Lancaster said that putting the bifocal segment high up compelled the patient to look through the upper part of his glass at distant objects, and therefore he was outside the desired zone of greatest clarity.

Dr. Adolph Posner asked about the practicality of hook-ons for reading purposes.

Dr. Sidney Olsho in closing said that most opticians made the vertical diameter of the lens too wide so that most patients do just what Dr. Lancaster described. Hook-ons have not been satisfactory for near work. The patient would of necessity look through a point far removed from the optical center. He stated that they should have an extra pair of lenses for near work only and these should have their centers low and inclined toward each other so that the axes converged toward the reading point.

Sidney A. Fox,
Secretary.

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VERTIGO

As implied by the etymology of the word "antipodes," the feet of two persons standing on opposite sides of the earth point in opposite directions, in relation to the position of the respective heads. Yet, even if they stand with their eyes closed, both persons will have the same general sense of position in space.

Disregarding for the moment the influence of vision, it is clear that the sense of position depends upon the relation of the individual to the earth's gravitational force. This is in spite of the fact that the individual is being hurled through space at enormous speed and is also subject to a whirling movement of the earth as it rotates upon its axis.

The sense of position, equilibrium in the space relationship, is commonly, but not always, reinforced by the sense of vision. It may be modified by motion of the individual through space, or by visible motion of objects around him.

In a rapidly moving airplane, beyond sight of familiar objects whose position in relation to the earth's surface is well known, changes of direction may become imperceptible and the individual may be entirely unaware whether he is facing earthward or skyward. But if an air pocket causes the plane to drop hundreds

of feet almost instantaneously, vertigo, with its attendant nausea and vomiting, may develop.

A small child, or even the inexperienced adult, who suddenly becomes conscious of the rapid downward or upward movement of an elevator in which he is riding may experience physical discomfort associated with a certain amount of psychic disturbance. Yet the person, sometimes even the young child, who is accustomed to riding in elevators may feel no inconvenience from such rapid motion.

Vertigo arises from consciousness, real or fictitious, of a disturbed relationship with space. The experience may be excited by visual, tactile, or gastro-intestinal nerve stimuli. It may also arise in the brain, from a new growth or vascular changes. The actual seat of the disturbance is in the semicircular canals of the internal ear, or the brain paths or centers related to these canals.

Because severe vertigo may point to disease of the middle or internal ear, any doubtful or persistent case should be investigated by the otologist.

Jones ("Equilibrium and vertigo," 1918) states that a large proportion of the cases of vertigo, as seen by the physician, arise from some form of toxemia, the simplest illustration being the dizziness produced by the ingestion of alcohol.

The ophthalmologist is fortunately in a position to relieve many of the milder and some of the fairly severe cases of vertigo, by furnishing a proper refractive correction. At the last meeting of the American Academy of Ophthalmology and Otolaryngology, an important feature was a symposium on vertigo. The ophthalmologic phases of the subject were discussed by Adler, who suggested explanations for some of the phenomena of ocular vertigo. The vertigo induced by looking down from the top of a building, for example, was attributed to a change in the position of the vanishing point. But many people experience no disturbance of the sense of equilibrium if the psychic element of fear is eliminated by the presence of a protective barrier. Perhaps the formula here is as follows: Fear plus change of perspective equals vertigo; or, change of perspective without fear equals no vertigo.

Hyperphoria has been mentioned as an important cause for that something very much like vertigo which we call car-sickness. Many car-sick patients have no hyperphoria, but are promptly relieved of the tendency by correction of moderate amounts of hyperopia or astigmatism. The present writer has observed several children in whom car-sickness occurred every time they were taken riding in an automobile, but in whom the disturbance ceased completely after careful attention to the refractive error.

Many patients who receive their first correction after cataract extraction are greatly bothered by a sort of vertigo. Adler offers the interesting suggestion that the difficulty here is due to the change in size of image which accompanies the wearing of the usual very strong plus sphere. But why, if the other eye is not being used, should enlargement of images affect the sense of equilibrium? Is it not rather more likely that the disturbing factor is the apparently increased rate of motion of surrounding objects, arising from the strong prismatic displacement associated with the high plus sphere, and induced by every turning of the eye or head? Every plus or minus spectacle lens produces such prismatic displacement, which becomes particularly noticeable if the patient's head is moved quickly sideways or vertically.

A contact lens produces no such effect. But, even with a weak sphere or cylinder, placed at an appreciable distance in front of the eye, the patient experiences in some degree the same effects as are observed

by the ophthalmologist every time he inspects a lens to determine whether it is a plus or minus cylinder or sphere.

Some patients are definitely annoyed by these effects during the first day or so of wearing a new correction. If they move their heads, the "with" or "against" action of the lens makes them feel as though the whole world were in motion around them.

With small corrections, or small changes of correction, the brain of the not-too-fussy patient soon learns to ignore this sense of motion. But the problem thus developed for the brain of the cataractous patient, in relation to his semicircular canals, is much more formidable. At first even a slight movement of his head in any direction produces a very marked disturbance in his sense of position in space. He becomes apprehensive, is often nauseated, sometimes falls.

With time and patience the difficulty is overcome. The action of the semicircular canals remains the same as before, but the brain has learned a new interpretation of the relation between the patient's position in space and the prismatic displacement caused by the strong lens.

To appreciate something of what the patient experiences under these conditions, the physician should pick up two or three strong lenses, hold them (one at a time) in the spectacle position before his eye, and move the head sharply from side to side. He will probably conclude that many of the problems which trouble patients upon acquiring new spectacles arise from prismatic displacement of the apparent position of objects; in other words, from the unfamiliar and more or less rapid variation in the patient's relationship to the external world.

Questions asked of the ophthalmologist by the general physician regarding the possibility of a refractive cause for vertigo frequently relate to elderly patients, especially arteriosclerotics. Sometimes meticulous care in correction of a neglected margin of hyperopia, or in balancing the correction of the two eyes, or in discovering the precise axis and strength of an astigmatic error, will give these sufferers great relief. But sometimes the effort is entirely unsuccessful, and among other causes it is possible that vascular sclerosis has affected the integrity of the internal ear.

When a sufferer from dizziness inquires as to the possibility of relief through careful refraction, it is proper to say hopefully that the matter is worthy of investigation, although the result cannot be foretold with absolute certainty.

W. H. Crisp.

THE PREVENTION OF BLINDNESS DUE TO GLAUCOMA

At the annual meeting of the National Society for the Prevention of Blindness, held in New York in December of 1941, Dr. Mark J. Schoenberg presented an excellent résumé of the role played by glaucoma in the causation of blindness and the steps, past, present, and future, of prevention work. He did not sufficiently stress the fact that between 15 and 20 percent of all of the blindness in the United States is due to glaucoma. Nor is this fact entirely comprehended by the ophthalmologists of the country. But with it staring us in the face, we would be derelict in our duty toward the public were we to fail to institute measures aimed at relieving that situation.

To prevent blindness from glaucoma, three logical steps may be taken, as follows: (1) get the patient into the hands of an ophthalmologist early in the course of the disease in order to forestall visual destruction, (2) give to the patient the best ophthalmologic treatment that modern science can dictate, and (3) keep the

patient under ophthalmologic observation and control.

All three steps are indispensable, and are so interlocked that the ideals of glaucoma management depend upon the fulfillment of the triad. It is not the value of the steps that needs discussion, but rather the methods whereby they can be accomplished.

It is futile to expect that the majority of people will be so aware of the nature and dangers of glaucoma that they will request periodic eye examinations as a preventive measure. Popular articles, such as the one that appeared in a recent issue of Life, are of considerable value, but are not an unmitigated blessing, because of the unwarranted fears that are aroused in psycho-neurotics (the article in question has brought to me more patients of that class than real or suspect cases of glaucoma). Publicity designed for popular consumption is of help, but is still far from providing a solution to the problem inherent in the first step.

The family practitioner is the first person with diagnostic ability who sees any individual with an actual or impending glaucoma, and it is to him that we must look for help in taking step 1. Although he does not possess the accurate diagnostic armamentarium that the ophthalmologist has, still he does have his tongue and his eyes and his fingertips, which are all that our forefathers in ophthalmology had. He can ask questions and he can observe the eye and he can feel the hardness of the eyeball, not alone in suspects but as a routine measure in his physical examination of every patient past the age of 30 years. He knew how to do this in his undergraduate days, but he has grown out of the habit. Nor has anyone impressed upon him the enormous value to his patients of such routine. So that puts squarely into the laps of the ophthalmologists the problem of reëducating the family practitioner of medicine in the routine of detecting early cases of glaucoma before visual damage is done.

Nor must the education of the optometrist be neglected. The major share of refraction in the country is performed by nonmedical refractionists, and to them falls the opportunity of rendering their patients a signal service by their early detection of glaucoma. It is certain that did an optometrist suspect glaucoma in one of his patients, he would not waste the patient's time and money by fitting a pair of glasses to such a diseased eye. But he does not know, and, as yet, we cannot teach him. It is hoped that some of the leaders in medicine will awaken to the fact that by such teaching we would be rendering a great service, both directly and indirectly, to the people of this country.

The second step does not need discussion at this point. Inasmuch as every case of glaucoma is a problem *sui generis*, each ophthalmologist must work out that problem to fit the circumstances. But, certain it is that the ophthalmic profession can prevent blindness in a large percentage of the cases of glaucoma, provided treatment can be started early enough.

The third step offers many difficulties and, to a certain extent, must be handled according to the intelligence and the economic status of the patient. The one common factor in all cases of glaucoma must be the endeavor on the part of the attending ophthalmologist or his assistants to impress upon the patient the nature of the complaint and the certainty of ultimate blindness as the penalty of neglect. But from here on the paths diverge. In the charitable and semicharitable clinics, social service has become a prime essential, and a well-trained social-service worker is a jewel beyond compare. She relieves the ophthalmic surgeon of the difficult task of telling the patient and

friends the facts of life relative to glaucoma. She investigates the home life of the patient and tries to straighten out difficulties that continue the emotional upset so common in glaucomatous individuals. She sees to it that the patient is regular in the use of whatever drugs the surgeon may order and explains the necessity of operation when this is indicated. And, above all, she keeps the patient under the continuous necessary medical control by telephone calls, by home calls, and by all the other means at the command of the resourceful social worker. When a clinic can afford to have a good social-service department for glaucoma, the problem is fairly simple. This is best illustrated by the complete reversal of figures that occurred at the Illinois Eye and Ear Infirmary. Before the glaucoma social-service department was installed, only 4 percent of the glaucomatous patients remained under observation for two years or more; since the installation, only 4 percent of such cases have disappeared from control or contact.

In private practice, the problem is much more difficult. Obviously, the same technique cannot be employed, although private patients show the same lack of understanding, the same discouragement, and the same fatalism that clinic patients do. No matter how carefully the situation is explained and no matter how often the explanation is reiterated, a fairly high percentage of such patients drift away, a few to other physicians, but the majority to a resignation to ultimate blindness. In order to try to remedy this situation, the Chicago Ophthalmological Society has declared it to be in order for ophthalmologists to write to their glaucomatous private patients that they have a disease of the eye that requires constant ophthalmic observation and that, for the sake of their ultimate vision, they should remain under treatment by an oculist. The letter is so worded that the patient may return to the writer or may visit any other oculist of his own choice, the form of the letter being prescribed by a committee of the Society.

What more can be done? It would seem that a well-written brochure, couched in simple terms for the laity, should be available for distribution to every glaucomatous patient by every oculist. It should not be worded so as to alarm the patient, but in it should be explained the character of the disease, the outline of the medical as well as the surgical treatment, the prognosis, and the necessity for continued observation. Such a pamphlet might well be written by a committee from the Section on Ophthalmology of the American Medical Association and printed at cost by the American Medical Association for distribution by its members.

But to keep after negligent patients, recourse must be had again to the family practitioner of medicine. He must be told again and again of the need for continued observation of all cases of glaucoma until it has become second nature for him to ask every patient who has ever had glaucoma as to whether he is still in ophthalmic hands. He can be reached in individual cases by the oculist, as often as necessary, but the busy oculist does not keep a tickle calendar of his glaucoma patients. It might not be a bad idea to do so.

Harry S. Gradle.

GENERAL ANESTHESIA IN OPHTHALMOLOGY

The majority of ophthalmic operations are performed under local anesthesia. Great strides have been made in this essential part of eye surgery in the last 20 years. The introduction of the Van

Lint akinesia, of the O'Brien block of the facial nerve, and of subconjunctival and retrobulbar injections has rendered formidable measures more or less innocuous.

There remain, however, impressive indications for general anesthesia in eye surgery. The nervous, uncoöperative, senile-cataract patient, the young strabismic child, the patient with an infected field, the patient whose orbit calls for exploration, the individual who requires plastic repair, and others in whom the eye is either too painful and inflamed or in whom the situation requires that tissues be as free as possible from the distortion produced by infiltration, all of these present problems of anesthesia that are not covered satisfactorily by the use of local measures.

When inhalation anesthesia is given, the use of cumbersome masks is necessary. These appliances restrict the already cramped and minute field, and present difficulties in keeping the field sterile—objections which undoubtedly have played a large part in the evolution of local anesthesia. They have also stimullated the development of the intratracheal method of inhalation anesthesia which, in the hands of experts, marked a great advance. The intubation of the trachea, even when done under direct view, as it always should be, entails the risk of bruising and even severely injuring delicate tissues.

Avertin as a basal anesthesia, supplemented with local instillation, has been satisfactorily used in eye surgery for a number of years. There are certain objections to its employment, however, chief of which are the fact that once in the rectum the dose cannot be further controlled, and the fact that recovery from the anesthetic may occasionally bring with it excitement and vomiting.

Intravenous anesthesia was introduced in 1872 by Ore of France, who used chloral hydrate for this purpose. Since then, other substances have been tested, culminating with pentothal sodium. The historical background for intravenous anesthesia has been described by Searles in a paper in the Journal of the American Medical Association (1942, volume 118, January 10, page 117). In view of the growing interest in, and importance of, intravenous anesthesia with the use of pentothal sodium, this article should be read by all ophthalmic surgeons. Searles clearly presents its many advantages in his description of the technique of administering pentothal sodium. More and more ophthalmic surgeons are finding the employment of this intravenous barbiturate, introduced by Lundy and Tovell in 1934, to be the answer to most, if not all, of their problems with respect to anesthesia.

When given by an expert its use permits the eye surgeon to perform all of his operations without trouble and apparently without much, if any, danger to his patient, even to the "poor risk." It has been successfully used in the very young and in the old. Ophthalmic operations, as a rule, are short, but even in cases in which much time is required, this anesthetic is satisfactory. It is particularly useful in cases of retinal detachment, of "apprehensive" cataract, and in operations for glaucoma. One of its chief advantages when employed for muscle surgery is that the eyes are generally in primary position, so that the degree of correction can be estimated as the operation progresses.

Recovery from the anesthetic is usually quiet, the patient rousing as from an ordinary deep sleep. Nausea and vomiting are infrequently observed, especially after operations of short duration. Here preliminary medication plays an important preventive role. It seems better, apparent-

ly, to allow the patient to "come out of it" without stimulation, although if necessary metrazol can be used. According to the reports, repeated anesthesia can be given to the same patient without incurring complications. For the patient the experience is relatively pleasant, far more so than after ether or chloroform anesthesia.

The use of sodium pentothal as an anesthetic in war surgery will be of great importance. The drug can be easily transported, and its properties are not altered by change in temperature. It, therefore, can be used in places where the administration of volatile ether would be out of the question. Its employment requires no elaborate apparatus beyond a hypodermic syringe, an air way, and a tourniquet. The ophthalmic surgeon is urged to investigate and become familiar with the use of this important new anesthetic.

Derrick Vail.

BOOK NOTICE

THE MODERN TREATMENT OF SYPHILIS. By Joseph Earle Moore, M.D. Second edition. Clothbound, 674 pages, numerous charts and illustrations. Baltimore, Charles C. Thomas, publisher, 1941. Price $7.00.

This second edition of a remarkably informative and comprehensive treatise on the subject of syphilis is worthy of review in an ophthalmologic journal, if for no other reason, than because of the masterly chapter on treatment of ocular syphilis. This occupies 25 pages. Much of the material is from the Johns Hopkins Clinic, where the author worked in collaboration with Dr. Alan Woods.

The author first points out the necessity of the full coöperation of ophthalmologist and internist: The systemic treatment is so involved with the treatment of other manifestations of the disease in the body that it would be wise on the part of the eye physician to undertake the therapy himself even though he were entirely conversant with the necessary technique, which is unlikely, and had the needed equipment. The author comments on the persistent superstition that arsenical drugs are apt to cause damage to the syphilitic eye. According to the author, arsphenamine and its derivatives have no deleterious effect on any structure of the eye. True toxic reactions are confined to conjunctival hyperemia and, very rarely, a superficial keratitis or corneal ulceration in association with a postarsenical exfoliative dermatitis. He also observes that the diseased eye may be seriously affected by a Herxheimer reaction following the initiation of arsenical therapy. Zimmerman considers this of importance only in patients with optic neuritis or primary optic atrophy. Concerning tryparsamide, its usefulness is in neurosyphilis alone, and there it may be used safely only when there is no involvement of the optic nerve or retina.

In general, the treatment of ocular syphilis is no different from that of syphilis elsewhere in the body with certain exceptions which the author then describes. For the general treatment of early lues he prefers arsphenamine followed by bismuth. Mapharsen may be substituted for the former, but thus far its virtues and its defects have not been so well determined.

Uveitis, iritis, and kerato-iritis must be treated for at least a year after serologic tests have become and remained negative.

Much consideration is given to the treatment of optic atrophy. Malarial therapy is preferred, and next in preference are subdural injections of arsphenamized serum to be followed by bismuth treatment. A prognosis of no further involvement of the sight or improvement is given in 50 percent of cases if the treat-

ment is begun at an early stage in the disease.

Interstitial keratitis should be treated as other forms of the disease. The prognosis, contrary to the opinion of the older writers, is definitely better with, than without, treatment.

A final page deals with surgery in syphilitics. In acute cases surgery should be avoided if possible, but in old cases—such as in older people with cataracts, in whom the systemic infection is discovered only by preoperative serologic tests—there is no contraindication to surgery, although a limited amount of postoperative antiluetic therapy may be advisable. The chapter ends with the note that in certain nonspecific lesions antiluetic treatment seems occasionally to be beneficial.

The entire book presents the subject of antisyphilitic therapy so simply, clearly, and comprehensively that it can be appreciated by any physician.

Lawrence T. Post.

CORRESPONDENCE

Aniseikonia and Orthoptics

December 2, 1941

Editor,
American Journal of Ophthalmology:

The writer of the editorial "Iseikonic enthusiasm" takes a broad view of the subject and aims to deal with it in a judicial spirit.

The writer points out that there is a well-recognized tendency toward "therapeutic optimism" and would group together the use of prisms, ocular exercises, and orthoptics with aniseikonia as examples of "several ophthalmic causes which have had their too passionate advocates." I submit that the writer has gone too far in his condemnation of orthoptics, probably because he has not had the excellent results that are enjoyed by those favored ophthalmologists who have expert orthoptic technicians of the modern approved type available for their orthoptic cases, and also that he has gone too far in his condemnation of the use of prisms and ocular exercise, although I happen to know that he wears prisms himself and frequently orders them.

These are clues or hints which make the reader prepared for misjudgments concerning aniseikonia later in the article. These are clearly not due to any intolerant, conceited, or unfriendly verdict, as is the case with some critics, but solely to a quite understandable lack of knowledge of the facts involved. For example, the editor says: "Since the difference in size of images is presumed to reside in the brain and can hardly therefore make important demands upon the nerve or blood supply of the eye or its external adnexa, ..." This is quite erroneous. The commonest cause of a difference in the size of the perceptual images derived from the two eyes is a well-marked physical, anatomical difference between the two eyes as shown by a difference in the refraction (anisometropia). Moreover, there is good reason to attribute many cases of aniseikonia not associated with anisometropia to other anatomic differences between the eyes, differences having their seat in the dioptric image-forming apparatus or in the retinal mosaic of the two eyes. It is not possible with our present lack of knowledge to do more than theorize, when it comes to the part played by the cerebral cortex (compare article in same issue of the American Journal of Ophthalmology by Talbot and Marshall). Whatever the anatomic seat of the disease aniseikonia* the important facts are that the patient has a considerable

* It is classified in the "Standard classified nomenclature of disease" under x10: "structures concerned in vision, generally and unspecified."

degree of adjustability, a considerable amplitude, comparable to the amplitudes of accommodation and of convergence. The "strain" from eyestrain is conceived of as a strain of the adjusting mechanisms. Aniseikonia is one of several defects requiring adjustment. It is in part local, in part central (cerebral). The "strain" in the cerebral part of the mechanism is conceived of basically as a conflict of clues which must be interpreted, reconciled, or suppressed.

The friendly attitude of the editor is shown in many sentences. I quote only one: "The subject of aniseikonia is worthy of fuller investigation in various parts of the United States; and the Dartmouth Eye Institute is evidently taking steps to promote such local study of the problem."

The Dartmouth Eye Institute has spared no efforts to guide the publicity along the most appropriate lines. The task is of a complexity and superhuman difficulty no one would guess unless he had tried it. It is a case of "protect us from our friends (and followers) and we will take care of our enemies." Thus in the circular referred to, the manner of presenting the subject to the profession—the advertising technique—is what is at fault and has caused the editor's disapproval. The facts are singularly free from assailable misstatements, for example, "the elaborate table of symptoms indicative of aniseikonia, which reads remarkably like a classical recital of symptoms attributable to eyestrain."

This is a true and approved list of symptoms which may be caused by aniseikonia for the simple reason that aniseikonia is one of the causes of eyestrain. Eyestrain from aniseikonia is indistinguishable by the symptom alone from eyestrain due to hypermetropia and astigmatism or due to exophoria. The only way is the way urged in the circular: "most careful correction of the refractive errors, correction of heterophoria, orthoptics, a thorough physical, dental, and neurological examination. If all these prove negative, an examination for aniseikonia is warranted." In this the circular follows faithfully the teaching of the Dartmouth Eye Institute.

Our conclusion is that the editor is justified in his friendly criticism of the technique of the authors of the circular, but that the statements set forth in the circular are not open to criticism. The Dartmouth Eye Institute is grateful for such friendly criticism and aims to profit by it. The paper presented at the recent meeting of the Southern Medical Association by another of the consulting editors of the American Journal of Ophthalmology is an example of the friendly criticism of a competent, skeptical, but judicial ophthalmologist which gives us particular gratification and encouragement because it so wholeheartedly abandons its early attitude of doubt and now endorses aniseikonia as one of the important causes of eyestrain.*

Since this editor has had adequate opportunities to observe the workings of an aniseikonia clinic and since his judgment is universally recognized as competent, his verdict will carry great weight. It is the earnest aim of the Dartmouth Eye Institute to earn such approval.

(Signed)
Walter B. Lancaster,
Chief of Staff
Dartmouth Eye Institute

* In it, the writer says: "I am convinced that there is much of value in the study of aniseikonia and the correction of aniseikonia in some patients. I have seen results that are almost incredible and have known of many patients attaining comfort who have never been able to get eye comfort through any other test. I have been very much of a skeptic on the subject, but have finally become quite convinced that aniseikonia is a matter of real importance and often of great value."

Iseikonic enthusiasm

January 5, 1942

Editor,
American Journal of Ophthalmology:

It is possible that certain passages in my editorial in the November issue on "Iseikonic enthusiasm" were not clear enough to prevent their being misunderstood.

On page 1322 my editorial spoke of several ophthalmologic causes having had their "too passionate advocates," and gave as instances "the earlier craze for fitting prisms, or even for some now less popular types of muscle surgery." Almost any of the older ophthalmologists know that there was a time when prisms were resorted to much more extravagantly than they are today, and that there was for a while a much greater vogue for certain types of muscle surgery than now exists. In other words, we may have an excess of enthusiasm concerning what is sometimes a good thing.

As regards orthoptic training, I said that "Rightly or wrongly . . . some excellent ophthalmologists" believed we were "going through a similar phase of exaggerated faith and enthusiasm as regards the permanent results to be obtained from orthoptic training." Since I never refer to myself as "an excellent ophthalmologist," I was obviously quoting the opinion of others. I gleaned my impression from ophthalmologists who have more intimate acquaintance with orthoptic training than I possess. Dr. Lancaster is wide of the mark in stating that I condemn orthoptics.

In speaking of the eagerness with which optometrists take up any mode of treatment that does not conflict with the law as to the practice of medicine, I went on: "Hence the optometric vogue for certain uses of prisms and ocular 'exercises' which were temporarily picked up and then for the most part dropped very promptly by our own profession many years ago." My reference to certain uses of prisms and ocular exercises having been dropped by our own profession is wrongly taken by Dr. Lancaster to imply that I "condemn the use of prisms and ocular exercises."

I have condemned neither prisms, nor orthoptic training, nor iseikonic lenses. I simply desired to point out that any form of therapy might be indiscreetly publicized.

In some cases there is absolutely no question as to the importance of aniseikonia. But the uncertainties of the situation are illustrated by Dr. Lancaster's statement "that the patient has a considerable degree of adjustability, a considerable amplitude, comparable to the amplitudes of accommodation and of convergence."

Such amplitudes in accommodation and convergence have given rise to important differences of opinion as to how far the patient should be corrected for defects involving either of these functions.

In the same way there may be room for doubt as to how far, in any individual case, a slight difference between the two eyes as to size of cerebral image (aniseikonia) is responsible for symptoms, or how far such symptoms are actually due to lack of accuracy or judgment in dealing with refractive errors.

In a case seen by the present writer the patient had been given a size correction to 2 percent at 90 degrees for the right eye and 1 percent at 180 degrees for the left eye. The left eye still experienced discomfort, and this eye readily accepted 0.50 D. more cylinder (plus axis 90°) than it was wearing.

Unfortunately the report that a supposedly thorough refractive examination has been made does not exclude the possibility that the refractive correction is still

inadequate. In considering the problem of aniseikonia, this fact might not be appreciated by general physicians of the state throughout which the circular was distributed.

My paragraph as to "the difference in size of images" being "presumed to reside in the brain" was, I regret, rather carelessly worded. I had been repeatedly assured that in a number of cases the difference in size of image did not depend upon a "well-marked physical, anatomical difference between the two eyes as shown by a difference in the refraction." I ought of course to have indicated that in such instances I was puzzled by the difficulty of explaining local irritative symptoms as due to aniseikonia.

I wonder whether the majority of ophthalmologists will feel that conservative handling of the subject of aniseikonia is consistent with sending to all the general physicians of a state a circular such as was quoted in my editorial.

A letter from the supervising officer of the local clinic contains the following informative comments: ". . . it is impossible to conduct aniseikonic examinations under a cycloplegic. . . . We do not do refraction on any patient that has come from a recognized ophthalmologist, as a matter of fact more of our patients come by referral with their latest prescription for glasses. We place the patient's prescription in the machine and the eikonic lenses affixed in front of them, but we do not use a cycloplegic because the accommodation must be functioning for the examination at near. All the clinical centers in the United States, with one exception to my knowledge, are operated by optometrists. . . . Really a successful ophthalmologist is overtrained as well as too busy to devote much of his time to aniseikonic examination."

(Signed)

Denver. W. H. Crisp.

Conservation of scholarly journals

The American Library Association created this last year the Committee on Aid to Libraries in War areas, headed by John R. Russell, the librarian of the University of Rochester. The committee is faced with numerous serious problems and hopes that American scholars and scientists will be of considerable aid in the solution of one of these problems.

One of the most difficult tasks in library reconstruction after the first World War was that of completing foreign institutional sets of American scholarly, scientific, and technical periodicals. The attempt to avoid a duplication of that situation is now the concern of the committee.

Many sets of journals will be broken by the financial inability of the institutions to renew subscriptions. As far as possible they will be completed from a stock of periodicals being purchased by the committee. Many more will have been broken through mail difficulties and loss of shipments, while still other sets will have disappeared in the destruction of libraries. The size of the eventual demand is impossible to estimate, but requests received by the committee already give evidence that it will be enormous.

With a paper shortage imminent, attempts are being made to collect old periodicals for pulp. Fearing this possible reduction in the already limited supply of scholarly and scientific journals, the committee hopes to enlist the coöperation of subscribers to this journal in preventing the sacrifice of this type of material to the pulp demand. It is scarcely necessary to mention the appreciation of foreign institutions and scholars for this activity.

Questions concerning the project or concerning the value of particular periodicals to the project should be directed to Wayne M. Hartwell, Executive Assistant to the Committee on Aid to Libraries

in War Areas, Rush Rhees Library, University of Rochester, Rochester, New York.

Acknowledgment

A recent communication from Dr. Kenneth L. Roper, of the Dartmouth Eye Institute, Hanover, New Hampshire, requests that we publish the following acknowledgment:

I wish to express appreciation to Dr. Glen Gregory Gibson, of Philadelphia, who did all the photography for the figures which appeared in the article on "Heredomacular degeneration" by Dr. Thomas A. O'Brien and myself in the January, 1942, issue of the American Journal of Ophthalmology.

(Signed)
Kenneth L. Roper.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP
ASSISTED BY DR. GEORGE A. FILMER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

6

CORNEA AND SCLERA

Lund, Axel. **A case of interstitial keratitis after phlegmon of an arm.** Acta Ophth., 1941, v. 19, pt. 2, p. 147.

A nurse 26 years old developed a severe abscess of the forearm caused by the prick of a needle, with bacillus proteus as the etiologic agent. Shortly after recovery from the abscess she developed a bilateral conjunctivitis, followed by a mild iritis, and a bilateral interstitial keratitis severe in the right eye and moderate in the left. Bacillus proteus could not be demonstrated in the conjunctiva. The author regards this as a case of endogenous interstitial keratitis, similar in pathogenesis to the endogenous gonorrheal diseases of the eyeball, in which gonococci cannot be demonstrated. Ray K. Daily.

Lund, Axel. **A family with Groenouw's hereditary dystrophy of the cornea.** Acta Ophth., 1941, v. 19, pt. 2, p. 153.

A review of the literature and a report of the three cases available for examination among 14 members of three generations. The first patient of the group, a woman 31 years old, developed an impairment of vision due to central choroiditis during pregnancy, and in the course of the examination it was found that both corneas in their central two-thirds had subepithelial star-shaped or ring-shaped grayish-white spots, leaving the periphery clear and having normal corneal tissue between the spots. An examination of the accessible members of the family revealed a brother with a unilateral involvement; this brother had three daughters of whom the oldest, aged 14 years, had lesions in both corneas. The parents of the original patient and a paternal and a maternal uncle had no evidence of the disease. The author regards this case as a granular corneal dystrophy, inherited dominantly.
Ray K. Daily.

Palomino Dena, Feliciana. **Corneal transplantation.** Anales de la Soc. Mexicana de Oft. y Oto-Rino-Laring., 1941, v. 16, May-June, pp. 156-170.

A description of Castroviejo's method is followed by report of animal experiments, and of two human cases. In one of these a definite optical improvement was obtained but the lens was found to be cataractous. In the other case there was slight optical improvement. W. H. Crisp.

Penido Burnier, Jr. **Keratoplasty.** Arquivos do Instituto Penido Burnier, 1940, v. 6, Dec., pp. 115-127.

A review of operations performed by Castroviejo in Brazil, with discussion of surgical procedure and of cases of failure.

Trematore, M. **Superficial punctate keratitis of Fuchs.** Lettura Oft., 1938, v. 15, Oct., pp. 363-374.

Four cases are reported of superficial punctate keratitis of Fuchs occurring during an epidemic of acute catarrhal conjunctivitis. After briefly reviewing the ophthalmologic literature on the subject of superficial punctate keratitis, the author comes to the conclusion that, in his cases at least, the etiologic factor is infective and, since it has a neurotropic action, is very probably a virus similar to or identical with that of herpetic keratitis. In each of Trematore's four cases healing was incomplete, despite the various remedies tried, even five months after the onset. Hence his conclusion that the remedies (yellow oxide of mercury, dionin, thiosinamine) have little effect upon the course of the disease.

Harry K. Messenger.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Ascher, K. W. **Aqueous veins.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 31-38. (3 illustrations, references.)

Bahr, Gunnar. **Is loss of fluid through the cornea of physiologic significance?** Acta Ophth., 1941, v. 19, pt. 2, p. 125.

The answer is in the affirmative, and this investigation is a contribution to the problem of the origin and drainage of the aqueous. The experiments were performed on narcotized rabbits whose corneas were attached to an apparatus in such a manner that a stream of dried air was forced over the cornea. Then the air was again passed over a drying medium, so that the quantity of moisture derived by the air stream from the cornea could be determined. The experiments were performed on normal eyes, and on eyes with emptied anterior chambers. The same experiments were performed on eyeballs eviscerated and stuffed with cotton, the corneas of which were moistened with artificial tears. The results indicated that in this manner 28 cubic mm. of aqueous per hour, or one tenth of the total aqueous content, may be obtained from the cornea of a guinea pig. This quantity of fluid increased with the rate of the air stream, and was greater than could be accounted for by the layer of tears overlying the cornea. The lacrimal corneal layer weighed about 3 mg. The author points out that the composition of the lacrimal fluid, which becomes more concentrated over the cornea, enables it to exert an osmotic and colloido-osmotic action and to promote passage of fluid through the cornea. The loss of fluid through the cornea is a normal physiologic process, disturbances of which may lead to pathologic conditions. Goldman and Rabinowitz demonstrated that in young rats prolonged opening of the palpebral fissure may lead to transitory lenticular opacities, which they attribute to the increased concentration of salt in the aqueous. Ray K. Daily.

Licheri, Giovanni. **A study on the behavior of the pupillary diameter and of the intraocular tension in rabbits subjected to roentgen irradiations of the sellar region.** Lettura Oft., 1938, v. 15, Dec., pp. 457-462.

The purpose of this study was to determine whether the pupil is dilated and the intraocular tension raised in the "absence" of the anterior lobe of the hypophysis. Previous studies made by Aldo Ferrari had shown that extract of this lobe when applied locally under certain conditions may produce miosis and lower the tension, whereas if injected intravenously, even in large doses, it does not have these effects.

It is surgically not feasible to remove the anterior lobe in small experimental animals, but this lobe is relatively radiosensitive, and examination of rabbits treated by radiation showed destruction of the anterior lobe. No alteration was found in the neurohypophysis and other nervous centers in the region. In none of four rabbits was there any variation in the tension or in the size of the pupil. The author concludes that absence of the prehypophyseal hormone in the rabbit does not modify either the pupillary diameter or the intraocular tension. Ferrari's experiments had shown that this hormone when introduced into the general circulation was similarly without effect. Since it may contract the pupil and lower the tension when applied locally, it is obvious that this hormone when it reaches the eye through the general circulation is inactive in these respects. The author admits three possible explanations: (1) the concentration may be insufficient, (2) the hormone may reach the eye in an altered chemico-biologic state, and (3) antagonistic hormones may be at work.

Harry K. Messenger.

Pimentel, P. C. **Two rare cases of congenital anomaly.** Arquivos Brasileiros de Oft., 1941, v. 4, Aug., pp. 192-193.

A Brazilian mulatto, aged 37 years, who came on account of a foreign body, showed many light spots throughout both irises, representing absence of pigment. The anomaly had been noted in infancy, and had continued in its original condition. (One illustration.)

The other case is mentioned in Section 11, Optic nerve. W. H. Crisp.

Urioste, J. P., and Garbino, C. **Iridocyclitis in the course of typhoid fever, treated and cured by the shock method.** Arch. Uruguayos de Med., Cirugia y Especialidades, 1941, v. 19, Sept., pp. 289-292.

The shock treatment was by means of an intravenous vaccine (prepared from proteid substances of typhoid bacilli in soda). The iridocyclitis was regarded as being of typhoid origin.

W. H. Crisp.

8

GLAUCOMA AND OCULAR TENSION

Aires, Francisco. **Psychology and primary glaucoma.** Arquivos Brasileiros de Oft., 1941, v. 4, Aug., pp. 196-215.

The author recommends closer attention to the possibilities of a relation between glaucoma and the reactions of the general nervous system.

W. H. Crisp.

Colomba, N. **Clinical researches on the venous system of glaucomatous patients.** Lettura Oft., 1938, v. 15, Sept., pp. 323-339.

This study was prompted in part by an observation of Rossi, who sought an intimate connection between glaucoma and the cardioaortic system. After re-

viewing many theories regarding the etiologic factors in glaucoma, the author discusses venous circulation and explains how venous pressure may serve as an index of the state of the venous circulation in general. He describes his method of determination, and establishes pressures of 70 and 115 mm. H_2O, as the limits of normal. The arterial and venous pressures of 14 patients with various types of glaucoma were tabulated. The average venous pressure was 121 mm.H_2O, which is 6 mm. higher than the accepted upper limit of normal. Since the high venous pressure indicates an altered state of the venous circulatory system in general, the author concludes that a similarly altered state exists in the venous system of the eye.

The p_H of the blood was determined by a potentiometric method, which is described, and the results are tabulated. It was found that the p_H tended to be high; that is, in patients with glaucoma there was a tendency to alkalosis. A hematocytologic examination, including red count, differential white count, and determination of the globular value and hemoglobin, was also made, but nothing abnormal was found.

Harry K. Messenger.

Grosz, István de. **Quantitative determination of follicular hormone in eye diseases.** Acta Ophth., 1941, v. 19, pt. 2, p. 135.

To demonstrate the role of hormones in the pathogenesis of glaucoma the author determined the quantitative excretion of follicular hormone in the urine of 13 glaucoma patients; one of these had simple glaucoma, four chronic inflammatory, one acute inflammatory, and five juvenile. The youngest patient was 19 years old, and the oldest, who had a malignant glaucoma, was fifty. The tabulated data show that in the majority of the patients the follicular hormone excretion was far below normal; in four cases it was about one half of normal. Because hormonal dysfunction is common and juvenile glaucoma rare, the author assumes in such cases the presence of a local hereditary predisposition, manifested in the form of a vascular disturbance or innervational imbalance. The author believes that diminished ovarian function acting through the vegetative nervous system is an important etiologic factor in glaucoma in young women, and that hormone therapy is indicated in such cases. Eight nonglaucomatous patients were also tested for their hormone excretion; of two cases of phlyctenular keratitis the hormone content of the urine was normal in one case, and inadequate in the other. A case of corneal dystrophy, and a case of secondary glaucoma due to interstitial keratitis, had normal hormone excretion. A case of chronic uveitis with secondary glaucoma, one of periodic exophthalmos, one of corneal ulcer, and a case of superficial keratitis showed diminished hormone production. The data are inadequate for definite conclusions, but they indicate a field for further research.

Ray K. Daily.

Licheri, Giovanni. **A study on the behavior of the pupillary diameter and of the intraocular tension in rabbits subjected to roentgen irradiations of the sellar region.** Lettura Oft., 1938, v. 15, Dec., pp. 457-462. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

9

CRYSTALLINE LENS

Rivas Cherif, Manuel de. **Iridectomy in the cataract operation.** Anales de la

Soc. Mexicana de Oft. y Oto-Rino-Laring., 1941, v. 16, March-April, pp. 71-86.

The author considers iridectomy unnecessary in the great majority of cases. It does not prevent prolapse. If after the corneal incision the iris shows a tendency to prolapse spontaneously, or if this tendency becomes manifest when the patient is invited to look in different directions or even to talk, it is then considered advisable to do an iridectomy as a therapeutic procedure for relief of the prolapse which has already become manifest.

W. H. Crisp.

Parry, T. G. W. **Cataract extraction in refractory patients and the operative treatment of iridodialysis.** Brit. Jour. Ophth., 1941, v. 25, Dec., pp. 553-555.

The author describes cataract extraction by procedures "not quite orthodox" but with stimulating effect. With the same "slightly out-of-the-way operative methods" in mind, he also describes an iridodialysis. The first patient, with bilateral cataract, was a farm laborer about sixty years of age. A preliminary iridectomy had been performed, and it had then been found that the patient was accustomed to arising at five in the morning at home and persisted in the habit while hospitalized. To safeguard against this undue activity, the capsule was torn and the lens thoroughly stirred up with a Ziegler knife. The eye was then left alone for about ten days, giving the lens time for "fluffing up." A keratome incision was then made above, and the lens matter largely washed out. The nucleus passed with some difficulty through the small keratome incision, which was therefore slightly widened on either side. Patience and gentle pressure above and below the wound brought the nucleus through. The pupil was clear after final irrigation. There was no tendency of the wound to gape. After the usual atropine and argyrol, and with only the operated eye bandaged, the patient walked back to the ward and continued as an ambulant until eight days later when he was discharged with a good result. Six other cases have been treated in similar manner since, the results being good in each case. The method employed requires more patience than the straightforward extraction and is not so clear-cut, but this is compensated for by release from postoperative anxiety. In the last of the cases so managed, the nucleus was broken into five pieces with the Ziegler knife and delivery through the small incision thus expedited.

The author also discusses the case of a boy aged 16 years whose iris had been torn away at the root for over half its circumference. A simple procedure is described which resulted in no disfigurement and no ocular reaction. Three small operations were required to attain the end result. The author learned later that what he had thought to be a new procedure had previously been described by Wheeler of New York. The method is recommended for its simplicity and good results.

D. F. Harbridge.

10

RETINA AND VITREOUS

Albrich, Konrad. **Endarteritis obliterans—retinal periphlebitis.** Graefe's Arch., 1940, v. 142, pts. 2 and 3, pp. 286-303.

The author describes a patient with recurrent vitreous hemorrhage, retinitis proliferans, and recurrent iritis, who was markedly sensitive to tuberculin.

A circumscribed swelling of the muscles of the right upper arm became painful and enlarged with the administration of tuberculin. A biopsy revealed changes typical of endarteritis obliterans.

The author points out that there are many striking similarities in the histologic picture of endarteritis obliterans and retinal periphlebitis, making it difficult to distinguish between them at certain stages. Clinically they both occur predominantly in males, 217 to 1 in endarteritis obliterans and 34 to 1 in retinal periphlebitis. On the basis of the author's case and the many similarities in the two disease pictures, he suggests an allergic basis for both. In his case an allergy to tuberculin was responsible. Frances C. Cogan.

Coppez, Léon. **Pathogenesis of retinal degeneration and its treatment by pyrometric diathermo-coagulation.** Bull. de l'Académie Royale de Méd. de Belgique, 1941, v. 6, no. 4, pp. 232-257.

The author reviews the results yielded by his procedure (see Amer. Jour. Ophth., 1933, v. 16, p. 563). Good results have been obtained in 80 percent of 108 cases considered as favorable. Of 108 further cases called unfavorable, 23 percent showed complete cure, and 29 percent relative cure (without macular vision).

It is the large detachments and the large tears which do not heal. Recurrences and relapses arise from excessively localized operation. Failure occurred in most of the cases in which the general statement of health was definitely bad, in spite of favorable local appearance.

Coppez considers the primary basis of retinal detachment to be nearly always vascular, from an arteritis in the terminal arterioles of the retina, followed by choroidal degeneration, retinal atrophy, and tear. Retinal detachment is characterized comparatively by the author as presenting in miniature what is seen on a larger scale in pulmonary infarction. If the patient is young and healthy, spontaneous healing of the local vascular lesion is likely to occur. In less favorable cases, detachment is induced. W. H. Crisp.

Craig, W. McK., Wagener, H. P., and Kernohan, J. W. **Lindau-von Hippel disease.** Arch. of Neurol. and Psychiatry, 1941, v. 46, July, p. 36.

In studying angiomatous nodules in cerebellar cysts Lindau observed an association of this lesion with angiomatosis of the retina, and by studying the reported cases of the latter disease he noted that it was not unusual to find a systemic angioblastic disorder of the central nervous system associated with a cystic pancreas, cystic kidneys, and more rarely with hypernephromas, tumors of the epididymis, and angiomatosis of the liver. This conception represents a newly recognized disorder, probably of congenital origin and due to maldevelopment of the mesoderm in the third fetal month.

Twenty percent of the cases of angiomatous cysts have been observed to be familial, sometimes in three generations. The important diagnostic signs are a long history of intermittent headaches accompanied by papilledema and unsteadiness in walking and turning, together with an associated angioma of the retina. There are many cases of Lindau-von Hippel disease in which the syndrome is incomplete. Angiomatous lesions of the retina were present in all of the four cases of hemangioblastoma of the cerebellum reported here. From the ophthalmoscopic standpoint, these cases represent four dis-

tinct phases of the disease. In one case the onset and development of the retinal lesion were very atypical, simulating tuberculous cnorioretinitis with periphlebitis. In another case the lesion was confined to one eye and papilledema was not present. In the two remaining cases, angiomas were present in both retinas.

Edna M. Reynolds.

Danis, Marcel. **Ocular lesions in polycythemias.** Académie Royale de Méd. de Belgique, Mémoires, 1941, v. 1, no. 6, pp. 1-36.

This 31-page work, printed by the Belgian Academy as a separate monograph, and reviewed by Coppez in the Academy's Bulletin, v. 6, no. 5, summarizes cases previously published in the literature since Knapp's report in the year 1861. Danis then describes six personal cases.

In the first patient, a child of ten years, a generalized cyanosis accompanied a large interventricular communication, stenosis of the pulmonary artery, dextroposition of the aorta, and dilatation of the right ventricle. In a woman of 28 years, similar ocular and general signs accompanied retraction of the pulmonary artery with interauricular and interventricular communication.

The third patient, a man of 48 years, had Ayerza's disease. A man of 52 years had dilatation of the aorta and the right auricle, with hypertrophy of the left ventricle. A man of 50 years showed venous dilatation throughout the body and dilatation of the right ventricle (Vaquez's disease).

The sixth case was of special interest. A man showed cyanosis, and red cells 7,900,000. There was no heart disease, but the patient was found to be suffering from chronic intoxication by carbon monoxide which was present in the gas used at his factory, in the proportion of from 4 to 11 percent. (Color photographs of fundi, bibliography.)

W. H. Crisp.

Ellis, R. W. B., and Law, F. W. **Infantilism, obesity, and retinal dystrophy; a "forme fruste" of the Laurence-Moon-Biedl syndrome.** Arch. Dis. in Childhood, 1941, v. 16, June, p. 105.

The retinal dystrophy in the case reported was shown by retinal atrophy with pigment migration and macular degeneration. There was not the slightest ophthalmoscopic or clinical resemblance to retinitis pigmentosa. The case is classified in the Laurence-Moon-Biedl category in view of the general clinical picture and the family history as well as on the basis of the ophthalmoscopic findings. It is the authors' opinion that typical retinitis pigmentosa is the exception rather than the rule in these cases.

Edna M. Reynolds.

Gradle, H. S. **Retinal detachment.** Ophth. Ibero Amer., 1941, v. 2, no. 4, pp. 245-250.

The author believes that, for cases in which the tears are near the macula, electrolysis has a marked advantage in that it produces smaller and more definitely limited scars. But for larger tears the scar obtained by electrolysis is generally inadequate. No case should be considered cured until a year after operation. There is no such thing as a partial cure: either the retina is reattached or it remains at least partially detached. Final reattachment may be delayed until several months after the operation. Thus it is undesirable to operate a second time until several months have elapsed after the first operation.

W. H. Crisp.

Kauffman, M. L. **Observations on eyegrounds of the newborn.** Pennsylvania Med. Jour., 1941, v. 44, Sept., p. 1583.

This study includes examination of the eyes of 3,381 newborn infants during the first 72 hours of life. Examinations were made after instillation of one drop of 0.5 percent atropine. Strands of fetal pupillary membrane were found so commonly that tabulation was abandoned early in the study. Retinal hemorrhages were found in 605 patients. Most of the hemorrhages were seen around the posterior pole. Flame-shaped hemorrhage was by far the most common type.

The following conditions were suggested as possible causes of retinal hemorrhages: (1) difficult labor, (2) maternal toxemia, (3) hemorrhagic disease of the newborn, (4) early rupture of the membranes.

Edna M. Reynolds.

Mattos, W. B. **Total and partial results in the operation for retinal detachment.** Arquivos Brasileiros de Oft., 1941, v. 4, Aug., pp. 169-184.

The author has done about one hundred operations. The traumatic cases were uniformly successful, while in the other cases about 50 percent showed more or less recovery of vision. Mattos does not hestitate to operate two or more times. He attempts to make the first diathermy puncture at the point of retinal rupture, allowing the subretinal fluid to escape. Eleven cases are described. W. H. Crisp.

O'Brien, T. A., and Roper, K. L. **Heredomacular degeneration.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 67-69. (One illustration, references.)

Samoilov, A. I., Fedorov, H. T., and Davidov, V. G. **Demonstration of retinal edema through the dynamics of electrical ocular sensitivity.** Viestnik Opht., 1941, v. 18, pt. 4, p. 355.

At the eye clinic of the Moscow Institute, the reduction in the size of the scotoma after calcium ionization is used as a test in the differential diagnosis of scotoma caused by retinal edema and that caused by other factors. This test is also of prognostic value. Its only disadvantage is the fairly good visual acuity required for campimetric study. Samoilov and his coworkers were searching for another method of demonstrating the effect of calcium on retinal edema, and the objective of this study was to determine whether the light and dark adaptation curves for the threshold of electric sensitivity could be used as such a test. The technique consisted in taking light and dark adaptation curves preceding and immediately following calcium ionization. It had been noted previously that in tuberculous choroiditis the difference between the light and dark adaptation curves disappeared and the two coincided. The tests showed that in normal eyes and in tuberculous choroiditis without retinal edema calcium ionization had no effect on the dark or light adaptation curves. In cases with retinal edema demonstrable ophthalmoscopically or campimetrically the adaption curves were restored to normal by calcium ionization. It was demonstrated that the calcium ions temporarily restore the normal electric sensitivity of the eye; in cases in which this restoration was not complete the effect of calcium was nevertheless very evident. The authors found this test also reliable in demonstrating the focal reaction following the administration of tuberculin, and the presence of retinal edema in early or inflammatory glaucoma. Inversion of polarity, which introduces

chlorine instead of calcium ions into the eye, gave entirely negative results, thus justifying the conclusion that calcium ions produce a transitory disappearance of retinal edema. Another series of tests was made to determine the effect of subconjunctival injections of sodium chloride on the dynamics of electric retinal sensitivity. The injections produced a retinal edema of about one-half-hour duration, which could be demonstrated by parallel effects on the size of the blind spot and on electric retinal sensitivity. Ray K. Daily.

Schmidt, Rolf. **Etiology of periphlebitis retinae.** Graefe's Arch., 1940, v. 142, pts. 1 and 2, pp. 1-15.

Retinal periphlebitis occurred in eight patients, five of whom had pulmonary tuberculosis. The sixth had a tuberculous tonsillitis and a history of previous lung infection which was assumed by the author to be tuberculous. Since the periphlebitis retinae in these cases appeared shortly after the onset of the pulmonary tuberculosis, there is reason to believe that it was also of tuberculous origin. There was no evidence that thromboangiitis obliterans caused the retina disease. The remaining two patients died while under treatment and were autopsied. In spite of careful clinical examination neither had shown any foci of tuberculous infection except the retinal periphlebitis. The autopsies revealed rapidly advancing tuberculosis of the lymph glands and liver in both patients and a generalized the most frequent source of tubercu- amyloidosis in one of them. These observations support Kruckmann's opinion that intrathoracic lymph glands are lous eye disease. Frances C. Cogan.

Sorsby, Arnold. **Retinitis pigmentosa with macular dystrophy.** Brit. Jour. Ophth., 1941, v. 25, Nov., pp. 524-526.

Two of four sons and one of two daughters in this familial group were affected. The father was a cousin of the maternal grandfather. Ophthalmoscopically both members of the family here described showed essentially similar pictures. Typical bone corpuscle pigment was distributed rather unevenly in various parts of the fundi, which also showed gross pigmentation here and there. Much of the choroidal circulation was exposed. The group supports the view that macular dystrophy cannot be put into sharp antithesis with generalized retinal dystrophy. (Figures, tables.)

D. F. Harbridge.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Aliquò-Mazzei, Alessandro. **Unilateral primary optic hemiatrophy, with signs of arteriosclerosis from antheromasia of the ophthalmic artery.** Lettura Oft., 1938, v. 15, April, pp. 141-149.

A possible cause of slowly progressive optic atrophy in elderly persons with marked arteriosclerosis is compression of the nerve by atheromatous vessels at the base of the brain. A nasal defect would indicate pressure on the lateral side of the optic nerve, whereas an homonymous hemianopsia would indicate pressure by the carotid upon the side of the chiasm. A unilateral superior horizontal hemianopsia is exceptional, but would indicate pressure upon the lower part of the optic nerve by a calcified ophthalmic artery. The clinical diagnosis in these cases of optic atrophy may be confirmed by a roentgenogram showing calcification of the internal carotid and of the point of

origin of the ophthalmic nerve. The author describes a case which he has personally observed and reviews similar cases reported by others.

Harry K. Messenger.

Gottlieb, B. **Vitamin-B-complex deficiency as a cause of retrobulbar neuritis and peripheral neuritis in a chronic alcoholic and pipe smoker.** Brit. Jour. Ophth., 1941, v. 25, Dec., pp. 556-564.

A man aged 46 years had symptoms of dimness of vision and prickling sensations in the hands and feet. In addition to a comprehensive description of the case in point, the literature is reviewed with respect to retrobulbar neuritis as occurring in association with other evidences of vitamin-B-complex deficiency.

Treatment consisted of a full mixed diet, with "Bemax" by mouth, and Vitamin B_1 intramuscularly daily. Discharging himself at the end of a week, as he felt well enough to return to work, the patient was advised to give up alcohol entirely but was permitted to smoke. The period of ensuing treatment is described, the final observations being nine months after admission to the hospital. When last seen, the patient was feeling well and was continuing the mixed diet, but had discontinued "Bemax" for the previous three months. There were no signs or symptoms of peripheral neuritis. Vision was 6/6 and 6/7.5. There was a central scotoma for red in the left visual field, while the temporal half of the left optic disc was pale. The blood pressure was 175/115. (29 reference, figures.)

D. F. Harbridge.

Lubimov, A. A., and Vinokur, I. I. **Optico-encephalitis, and its place among diseases of the optic nerve.** Viestnik Opht., 1941, v. 18, pt. 4, p. 401.

Under this term the author isolates a syndrome consisting of symptoms of encephalitis with marked visual disturbances. The absence of spinal symptoms, the slight involvement of the brain in this syndrome, and the more severe clinical course of opticoneuromyelitis with massive spinal symptoms lead the author to divide optic encephalomyelitis into two clinical entities: opticomyelitis and optico-encephalitis. Clinical histories of 26 cases of optico-encephalitis show that the disease sets in with headache, giddiness, nausea, and a short period of unconsciousness. Loss of vision or severe visual impairment follows promptly; the ophthalmoscopic picture is polymorphous, ranging from choked disc to optic atrophy. In the authors' series there was choked disc in six cases, edema of the disc in 6, optic neuritis in 5, atrophy in 12, and retrobulbar neuritis in 5. There was constriction of the visual fields in 12 cases, central scotoma in 4, tubular fields in 3, and normal fields in 8. In addition to the ocular symptoms there were symptoms of encephalitis, ranging from involvement of the cranial nerves to mild hemiparesis. The encephalogram was negative for intracranial tumor; the filling of the subarachnoid spaces with air, absence of air in the ventricles, and dilatation of the ventricles were suggestive of cerebral edema or adhesions. The authors believe that this syndrome is a distinct clinical entity, separate from multiple sclerosis, and opticochiasmatic arachnoiditis.

Ray K. Daily.

Mendoza Gonzalez, Elias. **Optic neuritis in pellagra.** Anales de la Soc. Mexicana de Oft. y Oto-Rino-Laring., 1941, v. 16, July-Aug., pp. 191-193.

Seven cases are mentioned briefly. The usual treatment improved other

conditions without resulting in visual betterment. As regards the eye, better results were obtained by administration of thiamine chloride.

W. H. Crisp.

Moretti, Ezio. **Treatment of luetic optic atrophy.** Lettura Oft., 1939, v. 16, Dec., pp. 443-450.

This is a discussion of the various methods of treatment of parasyphilitic optic atrophy and is not a presentation of cases that have come under the author's own observation.

The author believes that all arsenical preparations in the treatment of this condition are potentially dangerous. Bismuth alone or in association with iodine and quinine is preferable. Fever therapy, especially malarial, is of proved value. Even surgery can conceivably be effective if the pathologic process is really a chronic posterior luetic meningoradiculitis. On the theory that the cause is a specific opticochiasmatic arachnoiditis, surgeons have been emboldened to operate and have achieved good results by freeing the optic nerves and chiasm from thickened arachnoid. The extremely inconstant and varied field changes are consistent with an inflammatory process involving the coverings of the chiasm and giving rise to interstitial optic atrophy.

Harry K. Messenger.

Pimentel, P. C. **Two rare cases of congenital anomaly.** Arquivos Brasileiros de Oft., 1941, v. 4, Aug., pp. 192-193.

In the right optic nerve of a white male aged 21 years, the normal rosy color of the upper half shaded into a chestnut color of the lower half. (One illustration.)

The other case is mentioned in Section 7, Uveal tract, sympathetic disease, and aqueous humor.

W. H. Crisp.

Scott, J. G. **Hereditary optic atrophy with dominant transmission and early onset.** Brit. Jour. Ophth., 1941, v. 25, Oct., pp. 461-479.

Scott reviews 61 cases of hereditary optic atrophy (32 males, 29 females). Onset was at about three years of age, the inheritance being direct from either parent in practically an equal percentage. As the onset is slow, the difficulty is not observed until early school years. Glasses do not improve the condition. (Tables, references.)

D. F. Harbridge.

Tolosa, Aderbal. **Oto-laryngo-ophthalmic contributions to the diagnosis of nervous disorders.** Arquivos do Instituto Penido Burnier, 1940, v. 6, Dec., pp. 9-21. (See Section 1, General methods of diagnosis.)

Watkins, C. H., Wagener, H. P., and Brown, R. W. **Cerebral symptoms accompanied by choked optic discs in types of blood dyscrasia.** Amer. Jour. Ophth., 1941, v. 24, Dec., pp. 1374-1383.

12

VISUAL TRACTS AND CENTERS

Argañaraz, Raul. **Heteronymous hemianopsias and intracranial tumors in the region of the chiasm.** La Semana Med., 1941, v. 48, Dec. 11, pp. 1389-1406.

An extensive review of the subject, with many visual fields of illustrative cases.

Chavira, R. A. **A paralytic syndrome of the supero-external wall of the cavernous sinus: complete motor ophthalmoplegia.** Anales de la Soc. Mexicana de Oft. y Oto-Rino-Laring., 1941, v. 16, March-April, pp. 87-118.

Two cases are reported at considerable length, with detailed discussion of anatomic and symptomatic grounds for the diagnosis. The first patient was an epileptic aged 24 years who lost consciousness and fell on her head from a height of 20 feet. The right posterior clinoid process was torn loose, and the fracture radiated through the sella turcica. There was infiltration of blood through the upper outer part of the cavernous sinus, compressing the third, fourth, and fifth nerves. The patient remained unconscious for seven days, but gradually recovered the functions of sight, taste, and smell, as well as the psychic faculties. There were fractures of the cranial vault and base.

In the second case the patient, a woman of 33 years, had been struck by an automobile. She remained unconscious four days. The diagnostic interpretation was of a fracture of the base at the level of the apex of the petrous portion, radiating to the outer wall of the cavernous sinus, and producing a hematoma with pressure on the third, fourth, and fifth nerves. All the lost functions gradually returned.

W. H. Crisp.

Deutsch, Leon. **Ocular symptoms in affections of the ear. 1. Palpebral edema.** Anales de la Soc. Mexicana de Oft. y Oto-Rino-Laring., 1941, v. 16, May-June, pp. 132-155.

The author considers the differential diagnostic value of palpebral edema, especially as an early symptom of thrombosis of the cavernous sinus. Illustrative cases are described.

W. H. Crisp.

Gama, Carlos. **Surgery of the hypophysis.** Arquivos do Instituto Penido Burnier, 1940, v. 6, Dec., pp. 32-54.

The history of hypophyseal surgery is reviewed, especially the contributions of Cushing to the development of special technique and accurate localization, and to better understanding of tumor development and histogenesis. A personal case is reported. In a woman of forty years, a large cystic tumor extended beyond the anterior border of the chiasm and the right middle fossa. The optic nerve was reduced in size, pale, and encased in the tumor. Although the right eye was blind and its light reflex absent, the author decided to spare the right nerve and to open the capsule of the tumor between the two optic nerves. This decision was subsequently justified by good recovery of the light reflex of the right side, with restoration of vision of large objects. The author speaks with approval of Cushing's intracapsular technique for removing hypophyseal adenoma.

W. H. Crisp.

Marthinsen, Reidar. **Supraclinoid carotid aneurysm.** Acta Ophth., 1941, v. 19, pt. 2, p. 141.

A review of the literature, a detailed discussion of the differential diagnosis, and a report of a case of a supraclinoid carotid aneurysm in a 59-year-old woman. Without preliminary symptoms, she suffered within 24 hours three attacks of unconsciousness of two-hours duration, followed by vomiting, headache, and disturbance of speech. Within a few days she developed symptoms of subarachnoid hemorrhage, with bloody spinal fluid. Two years later she had a similar attack; at this time the right visual acuity was 1/60, and the left 6/6. The right visual field had a concentric contraction with a large central scotoma. Five years later visual acuity in the right eye was 6/60, and only light perception was present in the left. The left optic papilla was atrophic. The X-ray and the arteriographic findings were nega-

tive. Operation revealed a large, median, completely thrombosed, supraclinoid aneurysm. Ray K. Daily.

13

EYEBALL AND ORBIT

Covitz, E. E. **Exophthalmos.** Amer. Jour. Ophth., 1941, v. 24, Dec., pp. 1423-1428.

Gatti Manacini, C. and Posarelli, A. **Alcoholization of the gasserian ganglion.** Rivista Oto-Neuro-Oft., 1941, v. 18, Jan.-Feb., pp. 1-27.

Ten cases of essential neuralgia of the trigeminus treated by alcohol injection are reported in detail. Preceded by local anesthesia with a 2-percent solution of novocaine, the alcohol was injected by the external route in the amount of about 0.5 c.c. through a needle 12 cm. long. The pain ceased soon after but protrusion of the eye, widening of the palpebral fissure, neuroparalytic keratitis, spasm of retinal blood vessels, and lowering of the intraocular pressure sometimes ensued. (Bibliography.) M. Lombardo.

Hernández Ramírez, R., and Hernández, N. A. **Residual exophthalmos after thyroidectomy in Basedow's disease. Cervical sympathectomy.** Arch. de Oft. de Buenos Aires, 1940, v. 15, Feb., p. 58.

A 32-year-old woman with a marked bilateral exophthalmos was seen three years after thyroidectomy. Cervical sympathectomy was performed on the left side under local anesthesia, and the superior and inferior ganglia with the connecting trunk were removed. An appreciable reduction of the exophthalmos was obtained immediately after the operation and the improvement persisted throughout an observation period of two years. The medical and surgical treatment of postoperative residual exophthalmos in Basedow's disease is discussed. In the author's experience very marked exophthalmos in goiter cases will not disappear after thyroidectomy, and in such cases he advises simple resection of the cervical sympathetic at the time of the thyroid operation. There are no serious or unpleasant complications and the improvement obtained is permanent.

Plinio Montalván.

Hoshi, K. **The significance of the specific intracutaneous reaction, the sedimentation rate, and the white-cell count in experimental ocular tuberculosis.** Graefe's Arch., 1940, v. 141, pt. 6, pp. 633-643.

The author attempts to answer the question as to whether and to what degree an isolated ocular tuberculosis can produce general toxic symptoms. Employing ten healthy rabbits he inoculated fixed amounts (0.05 to 0.0025 mg.) of bovine tubercle bacilli into the anterior chamber or the vitreous of one eye. The severity of the ensuing infection depended on the dosage of bacilli. A massive hyperemia and swelling of the iris with small nodules near the pupillary margin occurred in the first 10 to 20 days after inoculation. In the next 1 or 2 weeks there was an increasingly severe exudation in the anterior chamber and clouding of the cornea. At the most severe stage of the process the eye was removed for pathologic examination. In control animals in which the eye was not enucleated the cornea often became staphylomatous and frequently the globe perforated at the site of the inoculation, leading to a phthisis bulbi, but the inflammatory process never involved the surrounding tissues. Furthermore these animals usually had a tuberculous involvement of the lungs, liver, and kidneys.

White-cell counts were made before inoculation and at intervals of a week for seven weeks thereafter. There was a definite leukocytosis with a shift to the left of the neutrophiles, indicating an acute infection. Sedimentation-rate determinations made at the same time were found to be proportional to the severity of the ocular process.

The intracutaneous Mantoux test (0.1 c.c. of 1-percent old tuberculin), which was uniformly negative before the ocular inoculations, became strongly positive about two weeks after inoculation when the characteristic nodules appeared. Thus the author concludes that the Mantoux test has a diagnostic value in a tuberculosis confined to the eye. Frances C. Cogan.

La Ferla, G. A. **Orbital complications of sinusitis. The therapeutic efficacy of potassium iodide and its diagnostic usefulness.** Lettura Oft., 1939, v. 16, May, pp. 188-193.

Attention is directed to the close topographic relation of the sphenoidal sinus to the optic canal and the oculomotor nerve. Two cases are reported in which potassium iodide was therapeutically effective and diagnostically useful in that it promptly brought relief and thereby confirmed the presumptive diagnosis of sphenoidal sinusitis. One of these two patients, a 15-year-old girl, was essentially normal except for a complete unilateral ptosis that suddenly came on after a cold and was accompanied by a slight fronto-occipital headache. Thinking that retained secretion may have resulted in ectasia of the lateral wall of the sphenoidal sinus with consequent pressure upon the superior branch of the oculomotor nerve, the author prescribed potassium iodide in large doses. In a few days the headaches were intensified, there was a discharge from the nose, and the ptosis was reduced, disappearing completely within a week. The other patient, a 20-year-old girl, had sudden loss of vision in one eye and a slight fronto-occipital headache. The disc and surrounding retina of the affected eye were edematous. The provisional diagnosis was sphenoidal sinusitis. This condition might cause narrowing of the lumen of the optic canal, whereby retrobulbar neuritis would result from pressure upon the optic nerve and papilledema from pressure upon the vessels of the optic nerve. After a few days of treatment with iodide there was a copious discharge from the nose, and the vision rapidly improved. Harry K. Messenger.

Means, J. H. **The eye problems in Graves's disease.** Illinois Med. Jour., 1941, v. 80, Aug., p. 135.

Attention is drawn to a subspecies of Graves's disease in which the eyes, rather than the thyrotoxicosis, constitute the chief therapeutic problem. The main point in diagnosis of these cases is the fact that the patients often complain of nothing but their eyes and on examination show edema, injection, and chemosis of the conjunctiva with ophthalmoplegia and epiphora rather than the more classic signs of proptosis and lid retraction. In these cases the treatment should be designed to safeguard the eyes. Thyroidectomy is contraindicated. In many cases the administration of thyroid has been beneficial by decreasing the edema of the orbital tissues. Edna M. Reynolds.

Zertuche, Abelardo. **Exenteration of the eyeball with implantation of fat.** Anales de la Soc. Mexicana de Oft. y Oto-Rino-Laring., 1941, v. 16, July-Aug., pp. 202-219.

This 18-page article considers the relative merits of enucleation and ex-

enteration, and states the details of technique for exenteration with implantation of fat from the gluteal region. The author favors this method in spite of the fact that it is followed by slow cicatrization, and the further risk of hernia of the implanted fat.

W. H. Crisp.

14

EYELIDS AND LACRIMAL APPARATUS

Fazakas, Alexander. **Indirect strictures of the lacrimal duct in 319 cases.** Graefe's Arch., 1940, v. 41, pt. 6, pp. 662-664. (See Amer. Jour. Ophth., 1940, v. 23, May, p. 602.)

Frieberg, Torsten. **Some physiologic considerations in the treatment of the lacrimal passages.** Acta. Ophth., 1941, v. 19, pt. 2, p. 93.

The most important factor in the conduction of tears is the pump action of the lacrimal canaliculi during the closing of the lids, with the caruncle providing pressure against the canaliculi at the moment when the lacrimal fluid is forced toward the sac. The tests for the functional adequacy of the canaliculi and for stenosis at the various sites of the lacrimal pathway are described; the diagnosis should differentiate between obstructive epiphora and epiphora due to hypersecretion. Diminished pump action due to weakened muscle and fascia constituents of the lacrimal canaliculi may cause epiphora in the weakened eyelids of the senile, in facial paralysis, in emaciation, and in exophthalmos. The sites of predilection for stenosis of the lacrimal apparatus are the lacrimal puncta, the nasal opening of the canaliculi, and the nasolacrimal duct. In 3,600 patients the author encountered five cases of stenosis of lacrimal puncta; in all of these a satisfactory result was attained with the Bowman operation, which the author defends against the charge that the slit canaliculus interferes with the aspiration of the lacrimal fluid. Stenosis at the nasal end of the lacrimal canaliculi is most resistant to treatment; 26 such cases were encountered among 3,600 patients; in 21 the immediate result of probing was satisfactory, and in 5 negative. The treatment of stenosis of the lacrimal duct and of dacryocystitis was unsatisfactory until the development of dacryocystorhinostomy. The author, who does an intranasal dacryocystorhinostomy, notes with regret that the external operation is more widely used than the intranasal operation; he attributes this to the fact that patients with epiphora consult ophthalmologists first and ophthalmologists are not familiar with intranasal surgery. He finds that in the hands of skilled surgeons the two methods of dacryocystorhinostomy are equally effective. (Illustration.)

Ray K. Daily.

Gleserov, S. I. **Plastic surgery for cicatricial ectropion of the lower lid.** Viestnik Opht., 1941, v. 18, pt. 4, p. 397.

The difficulty in plastic surgery of the lids is due to two factors: (1) The freedom of the lid border, which permits it to evert easily under the tension of postoperative cicatricial contraction, makes the stability of the immediate result uncertain. (2) The particular elasticity of the skin of the lids gives it an appearance which contrasts sharply with transplanted skin, and makes the cosmetic result unsatisfactory. The author noticed that the surgical result was better the further the incisions were placed from the lid border. This led him to develop a new surgical procedure, the technique of which is clear from the illustrations. It

consists principally in making the incision over the cheek, freeing the skin from the cheek to the lid border, and pushing it up and filling in the defect below with a sliding flap. The cicatrix is not excised, but is freed along with the normal skin to the edge of the lid, and placed in a normal position; the surgical area is thus removed far from the lid and the cicatrices, and healing is rapid. After the lid resumes its normal position the cicatrices become less conspicuous. The results in 14 cases convince the author that this procedure is more effective than the less complicated current techniques.

Ray K. Daily.

Gutzeit, Richard. **Hormone treatment for menstrual and climacteric edema of the lids.** Klin. M. f. Augenh., 1941, v. 106, April, pp. 477-480.

Edema of the lids in women, either coinciding with menstruation or during the climacteric period, was treated by administering follicular hormone by mouth and in the form of ointment. Good results are reported in three described cases.

Gertrude S. Hausmann.

Ingraham, F. D., and Campbell, J. B. **Marcus Gunn phenomenon.** Arch. Neurology and Psychiatry, 1941, v. 46, July, p. 127.

Three cases of the "jaw winking reflex" are reported. One was in an infant aged five months, the second was practically identical with the case originally described by Gunn, and the third was in a patient with Jacksonian epilepsy. The third case is of particular interest because the reaction was produced by cortical stimulation.

Edna M. Reynolds.

Santoro, N., and Salvadori, L. **Eyebrows and eyelashes: their anomalies and alterations.** Lettura Oft., 1939, v. 16, Jan., pp. 3-38.

In this discursive article, which is in great part a review of the literature, are brought together many curious observations regarding eyebrows and eyelashes. The importance of these ocular adnexa in facial expression is weighed, and note is made of their treatment in art and literature. Many pathologic conditions, such as trichorrhexis nodosa, keratitis pilaris, and various mycoses, are briefly discussed. Among the authors' own cases are four of decoloration of the eyebrow, in two of which fright was recognized as a cause; five of poliosis of the cilia, which the authors conclude is closely bound up with circulatory and neurotrophic disturbances; and two of cilia completely embedded in the flesh (which the authors designate in incorrect Latin as cilia incarnata totalis).

Considerable attention is given to blepharitis, of which six types are recognized: desquamative, seborrheic, ulcerative, eczematous, angular, and parasitic. In reviewing one hundred cases the authors conclude that hypermetropia and especially astigmatism of the simple or compound hypermetropic variety frequently cause blepharitis in cases where the refractive error ranges from 0.50 to 2.50 D., but they do not find that blepharitis is attributable to higher refractive errors. Blepharitis associated with refractive errors is found to be commoner in females and in youth. (24 figures, bibliography of 70 items.) Harry K. Messenger.

15

TUMORS

Aliquò-Mazzei, Alessandro. **Plexiform neuroma of the eyelid.** Lettura Oft., 1938, v. 15, June, pp. 203-218.

After preliminary discussion of plexi-

form neuroma in general, with particular reference to its localization in the lids and to ocular complications, the author presents two cases of his own, in one of which the tumor had assumed enormous proportions. The neoplasia had been first noticed in the one case at about the age of one year, and in the other at about the age of ten. In both cases the tumor was removed with satisfactory cosmetic result. Because of great vascularization and extreme fragility of the vessels much bleeding was encountered. On the basis of anatomo-pathologic examination of the excised tissues the author concludes that the tumor takes origin from the perineurium and the epineurium, and in much less degree the endoneurium, without involving nervous elements (cells of the sheath of Schwann) as some have thought.

Harry K. Messenger.

Brav, S. S., and Brav, A. **Regressive myopia due to retrobulbar tumor.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 82-85. (References.)

Falls, H. F. **Familial incidence of retinoblastoma.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 42-47. (Genealogic chart, bibliography.)

Leopoldsberger, O. W. **The question of the neurogenic origin of choroidal sarcoma.** Graefe's Arch., 1940, v. 142, pts. 1 and 2, pp. 229-240.

According to Leopoldsberger, to be certain of the origin of a choroidal sarcoma from neurogenic tissue one must examine the tumor in its very early stages since a sarcoma may secondarily invade a nerve and produce changes in the nerve tissue resembling a primary neurogenic tumor. He reports three cases with very small nonpigmented tumors in the choroid and suprachoroidea, which he believes were primarily neurogenic involving ciliary nerves. In one case the fibers of the nerve were not pushed aside at the site of the tumor but were spread out through it. Only the very cellular appearance and the spindle form of the cells differentiated this tumor from normal ciliary nerve. The outer layers of the choroid were invaded at the thickest portion of the tumor and here it was impossible to determine the origin of the new growth. The other two cases were similar in type. The author concludes that these very small tumors would probably develop into the usual picture of choroidal sarcoma at which stage they could not be diagnosed definitely as being of neurogenic origin.

Frances C. Cogan.

Rones, Benjamin. **The early diagnosis of choroidal melanomas.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 39-42. (References.)

Szeglova, A. A. **Choroidal metastasis of hypernephroma.** Viestnik Opht., 1941, v. 18, pt. 4, p. 407.

A review of the literature on hypernephroma, its orbital and ocular metastasis, and a report of two cases. A man 67 years old developed loss of vision in the right eye, six years after removal of the left kidney for hypernephroma. The eye was enucleated and the diagnosis of choroidal metastasis confirmed microscopically. The second patient, a 39-year-old man, presented himself with visual impairment of the right eye. Temporally and up in the fundus, at about the equator, was a large, nodular, grayish-black neoplasm. The eyeball was enucleated, and there was a divergence of opinion on the microscopic diagnosis. The patient died ten months

later of general metastasis, and at autopsy a hypernephroma was found in the left kidney. (Photomicrographs.)

Ray K. Daily.

16

INJURIES

Bellucci, B., and Giannantoni, C. **Very early lesions from X rays in the human eye.** Lettura Oft., 1939, v. 16, May, pp. 173-186, and July, p. 246.

What is known about the effect of X rays upon the several ocular tissues is briefly summarized. Previous observations of other authors had been made only after a more or less long period of latency, and for the most part related to experimental animals. The purpose of this study was to determine the immediate effect of X rays. The occasion was afforded by the necessity of enucleating because of malignant tumor two anatomically and functionally normal eyes. One of these was subjected to X rays in high dosage one hour before enucleation, and the other six hours before. The alterations discovered on subsequent histologic examination were the same in each eye. The following conclusions were reached: (1) Lesions of human ocular tissues from the action of X rays administered in rather high doses are histologically demonstrable after a very brief interval (even as early as one hour from the time of irradiation). (2) The lesions occur in both anterior and posterior segments of the eye, but none were found in the crystalline lens or in the optic nerve. (3) Among the vascular lesions were dilatation of the lumen of the vessels of the iris, perivascular extravasations and engorgement of vessels in the ciliary processes, extravasations and vascular congestion in the choroid, and vascular congestion in the retina. These lesions must be considered important as explaining the development of glaucoma after an interval of time. (4) It is probable that irradiation cataract is caused only by the indirect action of the X rays, which might act upon the perilenticular fluids by modifying their chemicophysical composition and thereby inducing disturbances of nutrition in the crystalline lens. Some experiments performed by Hippel seem to have led the author to this conclusion. (5) These early lesions may become progressively worse, or some of them may regress and disappear.

Harry K. Messenger.

Campbell, D. R. **Ophthalmic casualties resulting from air raids.** Brit. Med. Jour., 1941, June 28, p. 966.

The care of eye injuries from air raids usually has to be given in the general hospitals because of the multiplicity of injuries received. Ophthalmic hospitals have been found of value only in the more chronic cases. Three main causes of ocular injury have been observed: (1) explosive incendiary bombs, (2) the sudden compression and expansion of the atmosphere caused by blasts, and (3) direct blows on the eye. Injuries from incendiary bombs usually consist of multiple foreign bodies plus an edema and softening of the cornea, conjunctiva, and sclera. Often it is best to delay complete removal of the foreign bodies until much of the reaction has subsided. From the blast itself retrobulbar and intraocular hemorrhages have been observed. Rupture of the choroid, acute glaucoma, and iritis also occur. Direct blows to the eye often cause perforation of the cornea and rupture of the sclera.

John C. Long.

Drews, L. C. **Aniline-pencil cyst of the orbit.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 72-74.

Fontana, Giuseppe. **A case of rubeosis iridis accompanying trauma.** Lettura Oft., 1939, v. 16, June, pp. 203-209.

A case of rubeosis of the iris accompanying trauma is reported. The patient, a 55-year-old peasant, was hit in the eye by the tail of an ox. When he was seen the following day there was a large abrasion of the cornea and secondary iritis. Two years previously the eye had suffered an attack of acute glaucoma. This attack had been controlled medically, and there had been no recurrence. The patient had mild diabetes. The abrasion promptly healed, but the iritis increased. Hyphema ensued, rubeosis developed, and in a month the eye was in a state of absolute glaucoma.

The author thinks it possible that trauma, in addition to arteriosclerosis of the ciliary vessels, may have favored the disintegration of the pigmented layer of the anterior uveal segment, thereby releasing pigmentary and cellular detritus from this layer to block the ways of egress of the aqueous humor. Glaucoma would then result, and the new formation of vessels on the anterior surface of the iris could be interpreted as a defense reaction in the interest of better nutrition of the altered iris tissue, Fontana agrees with other authors in holding that rubeosis of the iris may occur more frequently than in generally believed. (2 figures.)

Harry K. Messenger.

Heesch, Karl. **Lipogranuloma in the orbit following a rupture of a dermoid cyst.** Klin. M. f. Augenh., 1941, v. 106, April, pp. 482-483.

An orbital tumor had resulted from a blunt injury. Upon removal it was found histologically to consist of granulation tissue around fat cells pressed into the tissue.

Gertrude S. Hausmann.

Krasnov, M. L. **The use of the electromagnet for the extraction of weakly magnetic steel intraocular foreign bodies.** Viestnik Opht., 1940, v. 18, pt. 4, p. 421.

This laboratory investigation was divided into two parts. First the relative magnetic attractability of ten types of commercial steel was determined by measuring the distance from which a particle could be attracted by a 600 W. giant magnet. The graph depicting the findings shows a wide variation in magnetic properties, with carbon steel at one end of the graph, possessing 75 times the magnetic attraction of magnesium-chromium-nickel at the other end of the graph. The second part of the study dealt with experimental extractions of ocular foreign bodies of equal form and weight from enucleated pig eyes. Two giant magnets of 660 W. and 3700 W. respectively, and Hirshberg's hand magnet were used. Three series of extractions were investigated: from the anterior chamber, from the vitreous at the equator, and from the vitreous at the posterior pole. The extractions from the vitreous were performed by the anterior and diascleral routes. The tabulated results show that Hirshberg's hand magnet is effective only for extraction of highly magnetic foreign bodies from the anterior chamber, and is ineffective for particles of weakly magnetic steel alloys. The two giant magnets were equally effective, and were capable of attracting from the anterior chamber metals of com-

paratively weak magnetic attraction, but exerted no attraction on the majority of rustless steels. The same was true of extraction from the vitreous by the anterior or diascleral routes. A group of magnetologists are at present at work at the Helmholtz Eye Institute on the task of developing an adequate magnet for the extraction of commercial metals. This is a difficult task because a number of commercial metals belong to the paramagnetic group. The characteristic of this group is the fixed degree of the magnetic permeability, independent of the pull of the magnetic field; these metals are therefore unaffected by an increase in the power of the magnet. Ray K. Daily.

Krol, A. G. **Observations on the prolonged retention of magnetic foreign bodies within the eyeball.** Viestnik Opht., 1941, v. 18, pt. 4, p. 427.

Six cases are reported. In one a particle of steel penetrated the retina, and five months later there was complete retinal detachment. In the second case a particle of iron led to siderosis and blindness after 3½ years; a year later the eye was enucleated because of a severe iridocyclitis. In the third case there was ocular siderosis and reduction of vision to light perception 11 months after the injury. The same complications occurred in the fourth case within six months, and in the fifth within 18 months. The sixth eye developed a macular retinitis three months after the injury. These cases demonstrate that conservative treatment of magnetic intraocular foreign bodies is erroneous. Iron particles within the eyeball invariably lead to functional disturbances and blindness, and they should be promptly removed.

Ray K. Daily.

Licheri, Giovanni. **A case of traumatic double rupture of the sclera with consequent almost complete aniridia and subconjunctival luxation of the crystalline lens.** Lettura Oft., 1938, v. 15, Oct., pp. 375-385.

The author describes a rare case in which the sclera was ruptured in two places by indirect violence (the patient in falling from a bicycle had hit his eye against the handlebar), the lens was dislocated subconjunctivally, and almost complete aniridia resulted. The literature on indirect scleral ruptures and traumatic aniridia is reviewed. Only one other case report of multiple traumatic rupture of the sclera was found, namely, that of a weaver who was hit by a shuttle. The author's case is unusual in that the ruptures, instead of being in the region of Schlemm's canal, were 5 and 9 mm. respectively from the limbus. His theory of the mechanism of traumatic aniridia, at least in some cases, is that the lens, which receives the full effect of the blow after the scleral rupture has occurred, is dislocated into the anterior chamber and tumbles, and then drags the iris with it as it passes out through the wound. Harry K. Messenger.

Neblett, H. C. **Prolonged retention of a foreign body in the crystalline lens.** Southern Med. and Surg., 1941, v. 103, July, p. 391.

Two cases of retained foreign bodies are reported. The first patient, a woman of 33 years, had been struck in the left eye by a particle from an exploding detonating cap at the age of 11 years. The eye showed a slight iridodialysis and some lens haze. At the anterior surface of the lens haze was a glistening metallic substance. The vision of the eye was correctable to 20/25. The second patient was a man of 38 years

who had been struck in the left eye six years before by a small piece of steel. The lens showed a slight amount of haze nasally and three pin-point dots in the center. The vision of the eye was 20/20. The author recommended that both eyes be left alone unless cataract or inflammation occurred.

John C. Long.

Pardo, Ruggero. **Apropos of the work of Professors Bellucci and Giannantoni on "Very early lesions from X rays in the human eye" (see above).** Lettura Oft., 1939, v. 16, July, pp. 243-245.

The author casts doubt upon the conclusions of Bellucci and Giannantoni because the eyes with which they worked were not normal. Both had been affected by malignant tumor, and one had been treated previously with X rays. Pardo also recalls some studies that he made on dove eyes in 1912 to determine whether the histologic changes were present in the retina immediately after application of X rays, and to ascertain whether these immediate changes, if occurring, were the same as those produced by the action of light itself. At that time there was considerable interest in the question whether X rays were "visible." Pardo concludes that the morphologic changes observed were identical with those produced by the action of light and hence were physiologic, but in view of these recent studies he admits the possibility of their being really pathologic. Harry K. Messenger.

Parry, T. G. W. **Cataract extraction in refractory patients and the operative treatment of iridodialysis.** Brit. Jour. Ophth., 1941, v. 25, Dec., pp. 553-555. (See Section 9, Crystalline lens.)

Popov, S. G. **Simultaneous penetration of a metal splinter and two eyelashes into the anterior chamber.** Viestnik Opht., 1941, v. 18, pt. 4, p. 439.

A review of the literature and the report of a corneal perforation, with a piece of steel and two eyelashes penetrating into the anterior chamber. One eyelash was stuck in the iris, and the other in the lens. The patient was discharged with a traumatic cataract. This appears to be an unusual injury because a penetrating foreign body does not as a rule carry eyelashes with it.

Ray K. Daily.

Salvadori, Leopoldo. **A sporting accident with consequent retention of a rare foreign body in the orbit.** Lettura Oft., 1939, v. 16, March, pp. 87-89.

In a football game a player was kicked in the region of the left eye. The eyeball itself was not injured, but there was a wound through the upper lid. This healed within a few days. Later a painless abscess developed below the brow. When this was incised and drained a retained foreign body was found in the form of a piece of sole leather. Harry K. Messenger.

Schutz, J. A. **Removal of a nonmagnetic foreign body from the vitreous.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 70-71. (References.)

Velhagen, Karl. **The appearance of a radiating crystalline structure in an atrophic eye.** Graefe's Arch., 1940, v. 142, pts. 1 and 2, pp. 37-40.

A patient with a blind and atrophic eye was seen by the author eight years after the eye had been injured by an iron band. The eye was painful and inflamed. On clinical examination precipitates on Descemet's membrane, clouding of the aqueous, a hyperemic

iris, and a bloody membrane in the pupillary region could be seen. The eye was enucleated. On pathologic examination the cornea, sclera, and lens were found to be normal. The retina and choroid were separated and atrophic. In place of the vitreous, numerous cell shadows could be seen. Lying in this region surrounded by the detached retina was a dark-staining mass of radiating rods resembling the cysts often seen in retinal separation. This mass took basic aniline stains as well as hematoxylin and methyl violet. The reaction for iron was negative. The author concluded that it must be either a cystalline or a crystalloid structure.

Frances C. Cogan.

17

SYSTEMIC DISEASES AND PARASITES

Arisawa, Ryoiti. **Ophthalmologic studies with the virus of Japanese epidemic encephalitis. 1. Inoculation of the eyes of mice with the virus.** Sei-i-Kai Med. Jour., 1941, v. 60, no. 7, pp. 866-881.

The cornea, anterior chamber, vitreous body, and conjunctival sac of healthy mice eyes were inoculated with a virus prepared from the brains of mice infected with Japanese epidemic encephalitis. The typical lesion was produced in the cornea in 40 percent, in the anterior chamber in 70 percent, in the vitreous in 80 percent, not at all in the conjunctiva. When only one side was inoculated, the other side became equally involved, often resulting in panophthalmia. Shiro Tashiro.

Arisawa, Ryoiti. **Ophthalmologic studies with the virus of Japanese epidemic encephalitis. 2. Transfer of the virus to the eye.** Sei-i-Kai Med. Jour., 1941, v. 60, no. 7, pp. 882-907.

When the brain or peritoneal cavity of mice is inoculated with the virus, the optic nerve is first infected and then the eyeball becomes involved, the time of onset depending upon the place of inoculation. Similar inoculation of young rabbits shows that the virus is transferred to the anterior and posterior chambers and the optic nerve only, the cornea, vitreous humor, tear ducts, and tears giving no indication of the virus. Shiro Tashiro.

Black, George. **Report of a case of Wernicke's syndrome complicating pregnancy and associated with ocular complications.** Brit. Jour. Ophth., 1941, v. 25, Sept., pp. 424-427.

Following the first account of the condition published by Wernicke in 1881, when it was considered an inflammatory process, modern concept has indicated the cause to be an endogenous toxin and a vitamin deficiency. In the case reported dramatic results were noted after treatment with vitamin B_1 and tablets of nicotinic acid, the vitamin being administered by injection and the acid by mouth. The vision was impaired so that hand movements only were discernible, but it later improved to 6/6 in both eyes. The blood pressure was normal and the urine clear in the case reported, so pregnancy was not terminated. The author believes that the case resembles Wernicke's syndrome sufficiently to be so classified, and also that the patient's response supports the view that deficiency of vitamin B_1 was a factor. (References.) D. F. Harbridge.

Boros, Béla. **Studies of allergy in tuberculous eyes.** Graefe's Arch., 1940, v. 142, pts. 2 and 3, pp. 356-366.

The degree of allergy was determined by Groer's method in sixty patients with ocular tuberculosis. Accord-

ing to arbitrary standards worked out by Groer, the reaction may fall into one of three groups: (1) "pleoesthesia," or hypersensitivity, suggestive of an active tuberculous lesion in the body, (2) "homodynamia," a labile allergic state between the first and third groups, (3) "pleo-ergia," a state in which the body reacts but is not hypersensitive.

It was found that patients with phlyctenular conjunctivitis and to a lesser degree those with sclerokeratitis and periphlebitis belonged to the pleoesthetic type. Pleo-ergia predominated in iridocyclitis and choroiditis, except when the ocular disease was of an exudative inflammatory character. This group is very close to homodynamia, making the classifications somewhat arbitrary. It was also found that the allergic condition did not change in the active and regressive stages of the ocular process. Artificial disturbance of the pleo-ergic state which tended to increase sensitivity apparently also promoted healing of ocular lesions. The author concludes that the significance of Groer's classification is still uncertain. Frances C. Cogan.

Charlin, Carlos. **The toxic syndrome of ocular tuberculosis.** Amer. Jour. Ophth., 1941, v. 24, Dec., pp. 1392-1395.

Sales, Monteiro. **New considerations regarding neurocysticercosis.** Arquivos do Instituto Penido Burnier, 1940, v. 6, Dec., pp. 99-114.

Fifteen cases are outlined. Special diagnostic means mentioned include cranial roentgenograms (for calcification of cysts) and the complement fixation test. The latter showed 89.8 percent of positive results out of 675 blood tests. The test is apparently specific in the cerebrospinal fluid. A second test may prove positive although the first was negative. The only effective treatments are roentgen therapy and administration by mouth of the ethereal extract of male fern (0.6 gm. daily). (References, illustrations.) W. H. Crisp.

Schmelzer, Hans. **The significance of the blood picture in recognition and treatment of ocular tuberculosis.** Graefe's Arch., 1940, v. 142, pts. 2 and 3, pp. 338-355.

More than eighty patients with suspected ocular tuberculosis were studied with respect to the differential blood count after a diagnostic subcutaneous injection of tebeprotein (0.1 mg.). Three main types of reaction occurred: (1) The differential count did not change in the three or four days following the injection, indicating a lack of sensitivity. Either the patient had never had a primary tuberculous lesion or was relatively immune without being allergic, or there was an incapacity for reaction (Anergie). (2) An increase of neutrophiles with a shift to the left or an increase of esosinophiles occurred from 24 to 48 hours after injection. Both of these reactions indicate a state of hypersensitivity to tuberculin and if tuberculin is used therapeutically it must be employed with great caution. (3) An increase of lymphocytes occurred after the injection, indicating favorable immunity and moderate allergy. This was the most favorable group for tuberculin therapy. If a monocytosis appeared in this group during treatment it indicated a worsening of the patient's condition. However a monocytosis occurring in the hypersensitive group indicated improvement. Frances C. Cogan.

Srinivasas, E. V. **A case of Boeck's sarcoidosis.** Brit. Jour. Ophth., 1941, v. 25, Oct., pp. 493-495.

The case reported is that of a 45-

year-old woman with bilateral cataract. The left cataract was removed. A month after operation the patient returned with indications of cyclitis in the operated eye. After the customary treatment, covering about five months, the patient disappeared without being completely cured but returned in another month with pain and marked loss of vision in the eye. The case was determined to be one of sarcoidosis as based on the following findings: fullness of the upper fornix, the skin of the lid having no sulcus between the globe and the superior orbital margin; and a hard, nodular, tender mass found on palpation to be between the globe and the orbital roof without adhesion to either. The skin over the cheeks, neck, shoulders and upper extremities was dry and thickened. Daily general ultraviolet radiation for two weeks reduced the pain and the size of tumor. A tumor of this painful character has not been previously reported in sarcoidosis. Radiography revealed what the author terms healed sarcoidosis of the lung. No malignancy was apparent.

D. F. Harbridge.

Urrets Zavalia, A., and Anquin, M. H. de. **Considerations on a case of subretinal cysticerus.** Arch. de Oft. de Buenos Aires, 1940, v. 15, Feb., p. 47.

Subretinal cysticercus is reported in a male patient 18 years old. The only subjective symptom was blurring of vision for two weeks prior to the examination. In the macular region of the right eye a spheroid, grayish, cyst-like lesion was observed, about three disc diameters in diameter, and projecting forward into the vitreous. In the semitransparent contents of the cyst was a central white spot, corresponding to the scolex. After prolonged ophthalmoscopic observation an intermittent wavy motion of the surface of the lesion could be made out. There was papillary and vascular congestion of the retina but the intraocular tension was normal. The blood showed a moderate eosinophilia. In view of the location of the cysticercus, which made surgical removal impractical, the lesion was treated by application of 20 mg. of radium for 48 hours. Following this treatment the surface movement of the cyst ceased entirely. The lesion shrunk and was transformed into a degenerative area of opaque white color with numerous newly formed vessels. The patient did not return for further observation. (Black-and-white stereoscopic fundus photographs, color plate.) Plinio Montalván.

18

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Alvaro, M. E., and Merrill, E. B **Need and opportunity for prevention o blindness and conservation of vision** Arquivos Brasileiros de Oft., 1941, v. 4 Aug., pp. 184-191.

This article appeared in English i the Sight-Saving Review, 1940, no. 2 p. 91. It was read before the Federatio of Educational Associations.

Calendoli, Saverio. **A glance at th eye diseases of Albania.** Lettura Oft. 1939, v. 16, Nov., pp. 411-427.

The author spent nearly four month in Albania as oculist of the Italian Sanitary Mission. A classified table, with percentages, is given of 5,419 patients whose eyes were examined in ten provincial capitals where the Mission held ambulatory clinics. The author comments upon the principal ocular affections that he observed, compares them statistically with those of other parts of Europe, and draws in-

ferences regarding the most important characteristics of ocular disease in Albania. Trachoma is surprisingly rare, being found in only 1.3 percent of the total number of patients. The infrequency of this disease, which is so common among neighboring countries, is attributed to the robust constitution of the Albanians and their living in many small isolated groups rather than in urban centers. Angular conjunctivitis and pterygium are very common; the author thinks that the former may be at least a factor in the etiology of the latter. Cataract, simple optic atrophy (caused by syphilis, which has a high incidence in Albania), and refractive errors are also common.

Harry K. Messenger.

Comberg, W. **Remarks on visual disturbance caused by on-coming light in driving.** Klin. M. f. Augenh., 1941, v. 106, April, pp. 480-482.

No damage can be done to the eye by the headlights even though very strong. Suggestions are made for improving automobile lights and traffic conditions. Gertrude S. Hausmann.

Cosgrove, K. W. **Trachoma problems in Arkansas.** Southern Med. Jour., 1941, v. 34, Oct., p. 1037.

The "trachoma belt" is outlined. Trachoma is very prevalent in northern Arkansas and is contracted usually early in life. A system of clinics with local ophthalmologists, a consulting ophthalmologist, and full-time nurses has been instituted. Public education has been necessary.

Sulfanilamide orally and locally arrested activity in 83.5 percent of first-stage and second-stage trachoma cases. Cases in the third and fourth stages were greatly improved. There are 350 cases in need of surgery but legislation is needed for this. The cost of the program is outlined and an estimate made of the public money saved by the clinics in the prevention of blindness.

Robert O. Sherwood.

D'Amico, Diego. **Giuseppe Cirincione in the judgment of Italians and others.** Lettura Oft., 1939, v. 16, May, pp. 163-170.

This well-deserved eulogy of Giuseppe Cirincione (1863-1929), whom Ernst Fuchs called the most eminent oculist not only of Italy but of the whole world, was written by one of his former assistants on the occasion of the tenth anniversary of his death. Cirincione established the great eye clinic of Rome, and in 1900 founded "La Clinica Oculistica," a journal which he later combined with the long-established "Annali di Ottalmologia." He was also the first, as the author tells us, in Italy and in the whole world to employ corneal grafts successfully. The author draws at some length on a biographic notice (Giuseppe Cirincione: leader of Italian ophthalmology) by Park Lewis, which was published in the American Journal of Ophthalmology in 1930 (vol. 13, p. 707).

Harry K. Messenger.

D'Amico, Diego. **Ophthalmologic service in the central judiciary prisons of Palermo (report on the first year of its activity 1937 to 1938).** Lettura Oft., 1938, v. 15, July, pp. 243-273.

Prisoners who presented themselves at the infirmary because of ocular disease amounted to 6.5 percent of the total population of the prison, which averaged about 2,500 a day. The actual percentage of prisoners with ocular disease was probably much higher. Clinical statistics are given. The most important single disease was trachoma,

which was found in one fourth of the persons examined.

The author prefaces his report with a survey of criminal anthropology, and concludes with reflections on the paramount role that the sanitary service may play in the prevention of crime. Eye disease has a greater influence upon the mind of malefactors than any other, being considered by them as a form of divine nemesis. The great importance of treating trachoma is stressed. Harry K. Messenger.

Esser, A. A. M. **Long eyebrows.** Klin. M. f. Augenh., 1941, v. 106, April, pp. 486-489.

Very long eyebrows are not only found in Chinese art but in the art of other far eastern countries. The Chinese state that these long eyebrows signify holiness, and are signs of old age, wisdom of life, art, and piety. (One illustration.) Gertrude S. Hausmann.

Flynn, S. E. **Eye protection for aviators.** United States Naval Med. Bull., 1941, v. 39, Oct., p. 565.

The author suggests that glare protection for flying personnel may be obtained by a cap with a long, green-lined visor. He has observed that tinted lenses cause the eyes to burn and smart, create a drawing sensation, and decrease toleration to bright sunlight. He states that tinted lenses act as a crutch to the eyes' shutter system.

Robert O. Sherwood.

Geilikman, O. B. **Vocational adjustment of one-eyed people and people with a marked reduction of visual acuity in one eye, as prophylaxis of the good eye.** Viestnik Opht., 1941, v. 18, pt. 4, p. 433.

This is a follow-up of the vocational readjustment of 275 patients with ocular injuries which left the injured eye with less than 0.1 visual acuity. The investigation found 30 percent of these people employed in occupations too hazardous for one-eyed people. Some of these pursued their former occupations after recovery from the injury, and in other cases young people deliberately chose their vocations without regard to the safety of their one eye. The author gives a list of occupations from which one-eyed people should be excluded, this injunction to apply especially to beginners and apprentices. He urges a regulation to that effect, and the vesting of the responsibility for the enforcement of this regulation in an "agency for the safety of work."

Ray K. Daily.

Hunt, W. T. **An analysis of certain visual problems among elementary school children.** Pennsylvania Med. Jour., 1941, v. 44, Sept., p. 1527.

In the fifth grade of the Huntingdon schools, 126 children were examined by manifest and cycloplegic refractions along with duction, phoria, and cross-cylinder tests. Reading tests, intelligence tests, and Betts' test for stereopsis were also given. In 57 percent of the children no symptoms of ocular discomfort or visual inefficiency were reported. Approximately 19 percent presented near-point visual-acuity problems, and 11 percent far-point visual-acuity problems. A total of 11 percent showed faulty ocular motility, and 25 percent showed evidence of definite internal or external ocular pathology. A total of 62.4 percent were found to be in need of lens corrections. Approximately one third of the lens corrections were for near only.

Edna M. Reynolds.

James, R. R. **A fifteenth-century English translation of John of Ar-**

derne's "de cura oculorum." Brit. Jour. Ophth., 1941, v. 25, Nov., pp. 526-535.

The author quotes at some length from a translation, in medieval English, of a work in Latin which had been compiled from earlier treatises on ophthalmology. D. F. Harbridge.

Knudtzon, Karsten. **Frequency of eye diseases in Copenhagen school children.** Acta Ophth., 1941, v. 19, pt. 2, p. 174.

A review of the ophthalmologic records of 2,000 school children. The records show that 1 percent of the children had visual acuity which placed them in the school for weak-sighted children, 16 percent had defects for which they were referred to an ophthalmologist, 6.7 percent had anomalies of color vision, and 5.2 percent had strabismus. Myopia was found in 1.6 percent of the cases, a figure which appears to indicate that myopia is on the decrease. The thirty myopes found in this group had progressive myopia. The author suggests that in order to avoid undercorrection myopes should be refracted once a year. Ray K. Daily.

Lech, J., Jr. **Twenty years of ophthalmologic activity of the Penido Burnier Institute.** Arquivos do Instituto Penido Burnier, 1940, v. 6, Dec., pp. 55-66.

A series of graphs and statistical tables as to the work of this outstanding Brazilian institution.

Martin, Gerhard. **Eye movements as the cause of faulty piloting of airplanes, automobiles, and bicycles.** Graefe's Arch., 1940, v. 142, pt. 3, pp. 262-275. (See Section 4, Ocular movements.)

Penido Burnier, J., and Lech, J., Jr. **Trachoma in Brazil.** Arquivos do Instituto Penido Burnier, 1941, v. 6, March, pp. 156-212.

This 57-page article begins with a section on the origin and diffusion of trachoma in Brazil. The author accepts the opinion that the disease was carried into the country by successive waves of gypsies who, expelled from Portugal between 1718 and 1750, concentrated in the Brazilian state of Ceará in 1816. At the present time the principal foci of the disease are in the state of Ceará (northeast Brazil), and the states of São Paulo and Rio Grande do Sul (southern Brazil). The introduction of the disease into the state of São Paulo is generally attributed to German, Polish, and Italian immigrants. It is difficult however to explain why Germans and Poles who settled in the neighboring states of Santa Catarina and Paraná have remained free from the disease. It is rare in the urban centers and commoner in the rural areas, where sanitary conditions are less satisfactory.

Cases of trachoma apparently represent about 10 percent of all the cases admitted to the Penido Burnier Institute of Campinas, São Paulo, in the past twenty years. The disease is commoner among foreigners and children of foreigners. It is of relatively low malignity. It is being actively attacked by public and private health organizations. (15 pages bibliography, chiefly of South American origin; numerous graphs and tables.) W. H. Crisp.

Szinegh, Bela. **Ocular disease of Debrecen University students.** Graefe's Arch., 1940, v. 142, pts. 1 and 2, pp. 156-175.

During a period of three years 585 university students were examined. It was found that myopia was more fre-

quent and hyperopia and astigmatism less frequent than among elementary-school students. In the university group progressive myopia was rarely seen. A variety of lid diseases were found (blepharitis, chalazion, hordeolum). Inflammatory conjunctivitis was common but phlyctenular conjunctivitis was rare and trachoma exceptional.

Frances C. Cogan.

Tiscornia, A., and Vila Ortiz, J. M. **Trachoma and the workmen's compensation law.** Arch. de Oft. de Buenos Aires, 1940, v. 15, March, p. 105. (See Amer. Jour. Ophth., 1939, v. 22, Nov., p. 1318.)

19

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Fortin, E. P. **Anatomy of the choroid and ciliary nerves. Insertion of oblique muscle over the macula.** Arch. de Oft. de Buenos Aires, 1940, v. 15, March, p. 124.

There is no true insertion of the ciliary muscle in the sclera; the attachment is by means of minute arterioles so that during the contraction of the muscle it slides over the sclera. The so-called connective stroma of the choroid does not exist; the fibrils, instead of ending in it, are attached to the choroidal veins without surrounding or compressing them. These veins are striking in that their walls are extremely thin in comparison with their considerable lumen. This disposition favors osmotic changes. In addition to the existence of minute bundles of smooth muscle fibers, striate fibers are also present in the choroid.

The insertion of the oblique muscles takes place just behind the macula, which occupies the space between the insertion tendons of the two muscles. the optic nerve, traversing the scleral A considerable number of myelinated ciliary nerves penetrate the eye around thickness in a long and oblique fashion. They retain their individuality during their course through the perichoroidal space, but their terminal filaments in the ciliary muscle mingle with each other and form a rich ciliary plexus. (Photomicrographs.)

Plinio Montalván.

Grawitz, P. B. **Do tissues fixed in formalin for thirty hours still live?** Graefe's Arch., 1940, v. 142, pts. 2 and 3, pp. 326-337.

Pieces of rabbit lens and cornea were fixed for thirty hours in 10-percent formalin. They were then removed and washed briefly, and attempts were made to culture them in various ways. Cornea that had been implanted in a subcutaneous pocket in a rabbit after one hour showed slightly swollen cells filled with bits of nuclear material and chromatin threads. At four hours the nuclei had condensed and cells of abortive form were seen. In lens implanted in a similar way no change was seen up to 24 hours when a single fiber showed nuclear formation. According to the author the ground substance differentiates into protoplasm and chromatin. In twenty days single lens fibers showed round cells with large oval nuclei of epithelial character as well as spindle-shaped nuclei.

Pieces of lens and cornea which had been cultured in citrate plasma (Amer. Jour. Ophth., 1941, v. 24, p. 1458) showed changes similar to those just described, the cornea after two days and the lens after seventy days although the latter culture was infected. A similar picture was seen in formalin-

fixed lens that had been damaged by roentgen rays. In serum containing leukocytes neither lens nor cornea reacted. Controls cultured in physiologic saline did not react.

Frances C. Cogan.

Troncoso, M. U. **Microanatomy of the eye with the slitlamp microscope.** Amer. Jour. Ophth., 1942, v. 25, Jan., pp. 1-31. (26 illustrations including 4 color plates, bibliography.)

NEWS ITEMS

Edited by Dr. Ralph H. Miller
803 Carew Tower, Cincinnati

News items should reach the editor by the twelfth of the month.

Deaths

Dr. Casper Walker Jennings, Greensboro, North Carolina, died November 22, 1941, aged 43 years.

Dr. Henry F. Owsley, Poughkeepsie, New York, died November 17, 1941, aged 70 years.

Dr. William O. Bailey, East Orange, New Jersey, died December 7, 1941, aged 85 years.

Dr. Chalmer M. Harger, Seattle, Washington, died November 13, 1941, aged 50 years.

Dr. Esther Mitchell, Mount Sterling, Kentucky, died November 30, 1941, aged 75 years.

Dr. William K. Yorks, Chicago, Illinois, died November 26, 1941, aged 76 years.

Dr. George M. Case, Elmira, New York, died December 13, 1941, aged 80 years.

Dr. O. R. Lourie, Boston, Massachusetts, died October 27, 1941, aged 68 years.

Dr. Winfred Bryant Post, Carthage, Missouri, died December 22, 1941, aged 70 years.

Dr. Archibald H. Martin, Lynn, Massachusetts, died December 13, 1941, aged 69 years.

Dr. Julius Wolff, New York, New York, died January 26, 1942, aged 72 years.

Dr. Emile de Grosz, Budapest, Hungary, died in December, 1941, aged 76 years.

Dr. Martha Brewer Lyon, South Bend, Indiana, died January 18, 1942, aged 70 years.

Dr. Casey A. Wood died in California, on January 26, 1942. An obituary will be published in a later issue.

Miscellaneous

Friends and former associates of Dr. George de Schweinitz have planned to equip and furnish a room in the University Hospital, Philadelphia, to be known as the de Schweinitz Memorial Library. When completed this library will be open to all physicians and medical students and will comprise one of the best collections of ophthalmic literature in this country. Contributions may be sent to Mr. Edmund R. Purves, chairman of the committee for the de Schweinitz Memorial Fund, University Hospital, Philadelphia.

The School of Ophthalmology and Otolaryngology of the New York Eye and Ear Infirmary will give its annual postgraduate week from March 23d to 28th. There will be daily demonstrations, operative clinics, round table discussions, exhibitions, and formal papers. The guest ophthalmologists will include Dr. E. B. Spaeth, Dr. A. D. Ruedemann, Dr. Algernon B. Reese, and Dr. Derrick Vail. The entire staff of the ophthalmic department will take part.

The postgraduate course in aviation medicine and aviation ophthalmology that was to have been given from February 5th to February 7th at the George Washington University, Washington, D.C., was postponed because of the war.

A basic-science training course in ophthalmology is offered by the graduate department of ophthalmology at New York University College of Medicine. Dr. Daniel B. Kirby is the professor of ophthalmology and Dr. Conrad Berens is the director of the course.

Nine months of intensive training in ophthalmology are given in preparation for a residency in ophthalmology in an approved hospital. The standards of the American Board of Ophthalmology are used as a guide in outlining the curriculum. New courses instituted during the past year include: pharmacology, as a separate course from physiology and therapeutics; syphilis of the eye; medical ophthalmology; retinal physiology. Among the new instructors are Dr. Edward Hartmann and Dr. Wendell Krieg.

Application blanks may be secured from the Dean's Office, New York University College of Medicine, 477 First Avenue, New York, New York.

The Manhattan Eye, Ear, and Throat Hospital announces a very interesting series of evening lectures for its Hospital residents and graduate students with the following ophthalmologists taking part: Drs. Frank C. Keil, Martin Cohen, R. Townley Paton, Murray A. Last, Wendell L. Hughes, James W. White, and Plinio H. Montalván.

Societies

At the dinner meeting of the Minnesota Academy of Ophthalmology and Otolaryngology on Friday, February 13th, the following program was presented: "Results of surgical treatment of detachment of the retina" by Dr. Robert M. Ramsay, St. Paul; "Malignant exophthalmos" by Dr. Walter E. Camp, Minneapolis; "Some observations on foreign bodies in the bronchi" by Dr. Kenneth Phelps, Minneapolis; and "The management of certain forms of acute frontal sinusitis" by Dr. Lawrence R. Bois, Minneapolis.

The next meeting of the Pacific Coast Oto-Ophthalmological Society will be held from May 11th to 14th at Portland, Oregon. The officers are as follows: Dr. Ralph A. Fenton, president, and Dr. C. Allen Dickey, secretary.

At the meeting of the New York Society for Clinical Ophthalmology on March 2d a panel discussion on "Disturbances of ocular motility" was given by Dr. George P. Guibor, Dr. Le Grand H. Hardy, Dr. Luther C. Peter, and Dr. James W. White. The coördinator was Dr. Isadore Givner. The panel discussion was preceded by a paper on "Neuro-ophthalmologic aspects of eye-muscle disorders" by Dr. Israel S. Wechsler. The meeting was held at the Squibb Hall, 745 Fifth Avenue, New York City.

Personals

Lieutenant Commander A. M. Culler, formerly of Dayton, Ohio, is stationed at San Diego, California.

At a dinner meeting of the Cleveland Ophthalmological Club, Dr. F. Bruce Fralick, professor of ophthalmology in the School of Medicine of Michigan University, spoke on "Unusual external ocular findings." Dr. Fralick's paper was illustrated with many beautiful lantern slides.

Dr. Hugo B. C. Riemer announces the removal of his office in Boston to 29 Commonwealth Avenue.

The offices of Dr. David W. Wells and Dr. Ralph H. Hopkins have been moved to 31 Bay State Road, Boston, from the Hotel Westminster.

Dr. Delamere F. Harbridge, Phoenix, Arizona, whose services to the American Journal of Ophthalmology and the Ophthalmic Year Book extend over the past 27 years, has found it necessary to resign from work with our abstract department, on account of other responsibilities.

Dr. Theodore L. Terry announces the removal of his office to 140 Marlborough Street, Boston.

Dr. Michael J. Hogan, San Francisco, has been made director of the new laboratory recently opened at the University of California to be used for pathology and research in ophthalmology. The laboratory was made possible by a fund of $70,000, known as the Charles Taylor Reeves Foundation, the income from which is to be used in the study of diseases of the eye. Through a donation of Mrs. E. S. Heller the actual construction was accomplished.